Alcohol Abuse and Dependence

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$184.6 billion
Estimated Direct Cost	$ 50.4 billion
Estimated Indirect Cost	$134.2 billion
Reference Year	1998
IC Providing the Estimate	NIAAA
Direct Costs Include: Other related nonhealth costs	Yes, $24.1 billion
Indirect Costs Include:	
Mortality costs	Yes, $36.5 billion
Morbidity costs - Lost workdays of the patient	Yes, $ 1.9 billion
Morbidity costs - Reduced productivity of the patient	Yes, $85.7 billion
Lost earnings of unpaid care givers	No
Other related nonhealth costs	Yes, $10.1 billion
Interest Rate Used to Discount Out-Year Costs	6 %
2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 291; 303 ; 305.0.	
3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	Yes
Attributable to the subject disease as a secondary diagnosis	Yes
Of conditions for which the subject disease is an underlying cause	Yes
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total society
7. Approach to Estimation of Indirect Costs	Human capital

8. Source of Cost Estimate:

Updated estimates based on draft report prepared for NIAAA by The Lewin Group, October, 1999. Underlying estimates reported in Harwood, H.; Fountain, D.; and Livermore, G. *The Economic Costs of Alcohol and Drug Abuse in the United States: 1992*. Report prepared for the National Institute on Drug Abuse and the National Institute on Alcohol Abuse and Alcoholism, National Institutes of Health. NIH Publication No. 98-4327. Bethesda, MD: National Institutes of Health, 1998. Full text available at http://www.nida.nih.gov/EconomicCosts/Index.html

10. Other Indicators of Burden of Disease:

Prevalence of alcohol dependence and/or abuse: 13.8 million adults in 1992 (7.4% of population age 18+). Source: Grant, B.F.; Harford, T.C.; Dawson, D.A.; Chou, P.; Dufour, M.; and Pickering, R. Prevalence of DSM-IV Alcohol Abuse and Dependence: United States, 1992. *Alcohol Health & Research World* 18(3): 243-248, 1994.

People with an alcoholic family member: 98 million adults in 1992 (52.9% of population ages

18+). Source: Dawson, D.A., and Grant, B.F. Family History of Alcoholism and Gender: Their Combined Effects on DSM-IV Alcohol Dependence and Major Depression. *Journal of Studies on Alcohol* 59(1): 97-106, 1998.

Alcohol-attributable deaths: 110,640 in 1996. Source: Alcohol Epidemiologic Data System, National Institute on Alcohol Abuse and Alcoholism. Available at http://silk.nih.gov/silk/niaaa1/database/qf.htm

Years of potential life lost to age 65 (YPLL-65): 1,482,998 (average of 13.4 years lost per death). Source: Unpublished data from Alcohol Epidemiologic Data System, National Institute on Alcohol Abuse and Alcoholism.

10. Commentary:

Estimates of economic costs attempt to capture the magnitude and the multidimensional nature of the societal burden that results from alcohol abuse and alcoholism. The overall cost estimate comprises component estimates for health care costs, productivity losses, and various additional costs, including those associated with alcohol-related crime and motor vehicle crashes. Health care costs include both the costs of treating alcohol use disorders and the costs of treating the wide range of medical consequences of alcohol consumption. Productivity losses encompass losses due to alcohol-related deaths, earnings impairment due to alcohol-related illness, and additional productivity losses due to alcohol-related crime.

More than two-thirds of the estimated costs of alcohol abuse are attributed to lost productivity, with most resulting either from alcohol-related illness (47.5 percent) or premature death (19.8 percent). Most of the remaining estimated costs of alcohol abuse are in the form of health care expenditures to treat alcohol use disorders and the medical consequences of alcohol consumption (14.3 percent), property and administrative costs of alcohol-related motor vehicle crashes (8.5 percent), and various costs of alcohol-related crime (8.9 percent).

The study by Harwood *et al.* estimated the economic costs of alcohol abuse for 1992 and projected these estimates forward to 1995 by adjusting for inflation and population growth in the intervening period. A recent update projected the estimates forward to 1998 using similar techniques. Health care costs comprise a slightly larger share of the total in the 1998 projection, reflecting the continuing rise in the relative prices of health care services over the 1992-1998 period. Similarly, productivity losses represent a slightly smaller share of the total in the 1998 update because wages have grown somewhat more slowly than the general price level. The modest decline in the share of costs represented by property and administrative costs of alcohol-related crashes reflects the actual decline in the number of alcohol-related crashes through most of this decade.

Health care expenditures for treatment of alcohol abuse and dependence and for treatment of the medical consequences of alcohol consumption represent a modest fraction of the total costs of alcohol abuse. These costs were estimated using a wide variety of data sources, reflecting both the pervasive health consequences of alcohol consumption and the diverse health care system in the United States. Hospital costs associated with the medical consequences of alcohol

consumption were estimated based on the proportions of deaths from various diseases and other health conditions considered attributable to alcohol.

Productivity losses due to alcohol-related illness were estimated using data from the 1992 National Longitudinal Alcohol Epidemiologic Survey (NLAES), a nationally-representative data set designed to estimate the incidence and prevalence of alcohol abuse and dependence according to well-defined clinical criteria. Regression models of lost earnings and excess unemployment among individuals with a history of alcohol dependence were adapted in a microsimulation framework designed to account for demographic differences between those with a history of alcohol dependence and those who were never alcohol-dependent. Statistically significant losses were found only for males and only for reduced earnings, not for excess unemployment. A key finding of interest was that earnings decrements among males with a history of alcohol dependence were much larger for those who began drinking before reaching age 15 than for those who began drinking later.

Productivity losses due to premature deaths attributable to alcohol consumption were estimated based on the proportions of deaths from various causes that are caused by alcohol consumption. These include large fractions of the deaths from liver cirrhosis and other liver diseases and smaller proportions of deaths from various injuries, drownings, fires, certain cancers of the digestive tract, homicides, suicides, diabetes, and stroke. Productivity losses were estimated as the present discounted value of future earnings lost due to these premature deaths. The reported estimate is based on a 6 percent discount rate; use of a 3 percent discount rate instead would have increased the estimate of mortality costs by about 46 percent.

Estimates of the costs associated with Fetal Alcohol Syndrome (FAS) include both health care costs and productivity losses attributable to FAS. FAS is a characteristic pattern of birth defects resulting from prenatal alcohol exposure whose symptoms include pre- and postnatal growth retardation and central nervous system anomalies such as developmental delays, mental retardation, and skull or brain malformations. Of the estimated health care costs of FAS, more than 90 percent is accounted for by the costs of providing needed home and residential care to adult survivors of FAS with moderate to severe mental retardation, and the costs of special education for children and adolescents with the range of mental impairments that are associated with FAS. The 1992 estimate for FAS can be projected forward to 1998 using the same approach that was applied to other cost components, yielding an estimated cost of FAS of $4 billion for 1998, including $2.8 billion in health care costs and $1.3 billion in productivity losses.

Other components of the overall estimate include the costs of alcohol-related crime and property damage, insurance administration, and legal costs associated with alcohol-related motor vehicle crashes and fires. Crime costs encompass expenditures for criminal justice system administration and private legal defense as well as productivity losses sustained by victims of alcohol-related crime and by incarcerated perpetrators of such crimes.

Although estimates of the economic costs of alcohol abuse attempt to be as comprehensive as possible, and although the magnitude of cost revealed in these estimates is staggeringly large, there are important aspects of the burden of alcohol problems that are not captured in these estimates. Beyond the effects on health and economic productivity, alcohol problems exact a

heavy toll in terms of human suffering. Failed marriages, anguished families, stalled careers, criminal records, and the pain of loved ones killed or disabled from alcohol-related causes are aspects of this suffering that cannot be accounted fully in a cost-of-illness framework. In addition, secondary effects of alcohol problems on economic market outcomes are not reflected in estimates of the economic cost of alcohol abuse. For example, alcohol problems contribute to the likelihood of automobile crashes, and hence raise insurance premiums. As a result, fewer goods and services can be purchased by consumers who also purchase automobile insurance. Similarly, alcohol problems are known to contribute to workplace accidents and absenteeism, thereby increasing the cost of labor to businesses, with potential effects on total employment and production over and above the effects on individuals' productivity. The overall magnitude of such secondary economic consequences of alcohol problems is unknown, but the aggregate effect could be substantial.

Allergic Rhinitis (Hay Fever)

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ Not Available
Estimated Direct Cost	$ 1.9 billion
Estimated Indirect Cost	$ Not Available
Reference Year	1996
IC Providing the Estimate	NIAID
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	No
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	Not Available
2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification, (ICD-9-CM) for all diseases whose costs are included in this estimate: 477.	
3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Not Applicable

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

Ray NF et al, J Allergy Clin. Immunol., 1999; 103; 401-07.

9. Other Indicators of Burden of Disease:

It is estimated that 39 million persons in the U.S. experienced allergic rhinitis in 1987 (Malone, 1997). However, only 12.3% (4.8 million) sought medical treatment for allergic rhinitis (Malone, 1997). The number of individuals with allergic rhinitis has increased by 25% from 1979-81 to 1990-92 (CDC, 1997). The majority of these people are a subset of the 50 million Americans who are reactive to at least one of the 8 allergens known to contribute to allergic illness. In 1987, allergic rhinitis resulted in approximately 811,000 missed workdays, 824,000 missed school days, and 4,230,000 reduced activity days (Malone, 1997). Chronic sinusitis is the most commonly reported chronic disease, with 14.7% of the population (about 38 million persons) affected.

10. Commentary:

The previous estimate by McMenamin et al has been replaced by the annual cost estimate for allergic rhinitis performed by Ray et al due to the more current nature of the estimate as well as the inclusion of more services in the calculation of direct cost. Ray et al estimated direct healthcare expenditures for allergic rhinitis from two perspectives. The first estimate specified healthcare expenditures of $1.9 billion for allergic rhinitis as the primary coded diagnosis, while the second estimate of $5.93 billion included the cost of allergic rhinitis as a secondary diagnosis. For the second estimate, an expert panel using the Delphi consensus-building technique estimated the degree of overlap between allergic rhinitis and other disorders. This

technique allowed for estimation of the costs devoted to evaluation and treatment of allergic rhinitis but assigned to other airway disorders. These conditions included sinusitis, chronic rhinitis, acute upper respiratory infections, pharyngitis and tonsillitis, rhinorrhea, asthma, nonatopic conjunctivitis, and chronic otitis media and eustachian tube disorders. The $1.9 billion estimate for the cost of allergic rhinitis was chosen as the reported annual cost because this value is more direct and more easily understood.

Services included in the direct cost of allergic rhinitis were derived from inpatient and outpatient hospitals, emergency departments, ambulatory surgical centers, physician offices, and patient medications. Data from three National Center for Health Statistics (NCHS) surveys were used to determine the number of people who received care for allergic rhinitis in 1994.[1] The unit price per encounter was determined for each type of service on the basis of the 1987 National Medical Expenditure Survey (NMES) of the Agency for Health Care Policy and Research and was then inflated to 1996 dollars. The NMES comprised 14,000 households, representing 36,259 individuals. Total costs for each service were determined by multiplying the number of encounters by the unit price per encounter in order to determine the direct annual U.S. cost of allergic rhinitis for 1994. Indirect costs were not determined in this study. When allergic rhinitis was the primary diagnosis, the costs were directly ascribed to this disease. For the related disorders, the panel's final proportional estimates were multiplied by the total number of encounters for each airway disorder to estimate the cost of allergic rhinitis as a secondary diagnosis. These values were then extrapolated to 1996 values by using standard epidemiologic techniques. Data were further separated by age to assess costs for childhood (<12 years) and adult (>13 years) allergic rhinitis.

Also subsequent to the McMenamin reference, in 1997, Malone et al published an estimate of the cost of allergic rhinitis. Malone et al estimated the annual expenditure for allergic rhinitis at $1.15 billion in direct costs, and $1.23 billion in total costs, in 1994 dollars. This study also used data from the 1987 NMES to determine the annual U.S. cost of allergic rhinitis. Estimated expenditures were included for visits to outpatient offices, clinics, hospital offices, or emergency departments and for patient medication. Reported expenditures in this survey incorporate medical expenses, including consumer out-of-pocket and third-party payer expenditures. In cases where no costs were reported for services and products, approximations of the market value were determined by the Agency for Health Care Policy and Research. Indirect costs include lost work productivity, school absenteeism, and restricted activity days. Malone determined the prevalence of allergic rhinitis by examining self-reported data on a heath status questionnaire. In contrast to Ray, Malone determined the prevalence of allergic rhinitis in 1987 by examining self-reported health status questionnaire data from NMES. Person-level weights were used to estimate the number of persons who sought medical care, missed work or school, or were otherwise limited by allergic rhinitis.

The report of $1.9 billion in direct costs by Ray et al has been referenced here due to the detailed calculation of cost for treatment in each service category including institutional care as well as outpatient care. Ray et al collected data from several 1994 NCHS surveys for hospital discharges, office-based physician encounters, hospital outpatient encounters, ambulatory surgery centers, emergency departments, and prescriptions to calculate the direct cost for each service for 1996. These values were totaled for the estimate of the direct cost of allergic rhinitis for 1996.

Because of the nature of the NMES, neither the Ray nor the Malone study includes the cost of self treatment. However, Malone reports that retail sales of over-the-counter allergy relief products exceed $140 million a year (Waldrop J. Spring sneezes. Am Demographics 1993;15:4).

[1] The following 1994 NCHS surveys were used: the National Hospital Discharge Survey, the National Hospital Ambulatory Medical Care Survey, and the National Ambulatory Medical Care Survey.

Other references:

CDC. Prevalence of Selected Chronic Conditions: United States, 1990-92. Series 10: Data from the National Health Survey, DHHS Pub. No. 97-1522, January 1997.

McMenamin P. Costs of hay fever in the United States in 1990. *Annals of Allergy*. 73:35-39, 1994.

Malone DC et al, J Allergy Clin Immunol 1997; 99: 22-27.

Alzheimer's Disease and Other Dementia

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 100 billion
Estimated Direct Cost	$ 15 billion
Estimated Indirect Cost	$ 85 billion
Reference Year	1997
IC Providing the Estimate	NIA, NINDS
Direct Costs Include: Other related nonhealth costs	Yes
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	Yes
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	Not Available

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 331.0(1); 290.
3. Estimate Includes Costs:

Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	Yes
Of conditions for which the subject disease is an underlying cause	Yes

4. Population Base for Cost Estimate (Total U.S. pop or other) — Age 65+
5. Annual (prevalence model) or Lifetime (incidence model) Cost: — Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other) — Total Society
7. Approach to Estimation of Indirect Costs — Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

The estimated total economic cost of $100 billion is an inflationary increase of the costs originally reported by Huang et. al. and is supported by subsequent studies by Ernst & Hay.

Huang, L-F, Cartwright, WS and Hu, T-W, "The Economic Cost of Senile Dementia in the United States, 1985", Public Health Reports Vol. 103, No. 1, pp. 3-7 (1988).

Ernst, RL, Hay, JW, Fenn, C, Tinklenberg, J, and Yesavage, J, "Cognitive Function and the Costs of Alzheimer's Disease", Arch Neurol 54: 687-693, 1997.

Ernst, RL, and Hay, JW, "The US Economic and Social Costs of Alzheimer's Disease Revisited", American Journal of Public Health 84: 1261-1264, 1994.

9. Other Indicators of Burden of Disease:

Estimates of the prevalence of Alzheimer's disease in the population vary considerably, ranging

from 1.09 to 4.58 million individuals. A recent consensus statement developed by the American Association for Geriatric Psychiatry, the Alzheimer's Association, and the American Geriatrics Society puts the estimate of AD cases at 4 million persons nationally, and still concludes that Alzheimer's disease and related dementias are under diagnosed (Small, GW et al. JAMA 16: 1363-1371, 1997). It should be noted that the estimates provided above do NOT include dementias other than Alzheimer's Disease, and thus are a likely underestimation.

There is consensus among studies that prevalence of the disease increases with advancing age, doubling each 5 years over the age of 65. As the American population continues to age, it is projected that the prevalence will nearly quadruple in the next 50 years, by which time 1 in 45 Americans will be afflicted with the disease (Brookmeyer, R, et al. American Journal of Public Health 88: 1337-1342 ,1998).

Cost of AD care appears to vary by the stage of the disease. A recent cross-sectional study of 679 Alzheimer's disease patients from thirteen sites in nine states has estimated the costs of Alzheimer's disease care by disease stage and care setting (Leon J, et al. Health Affairs 17(6): 206-216, 1998). In 1996, annual costs of caring for patients with mild, moderate, and severe Alzheimer's disease were $18,408, $30,096, and $36,132, respectively. It was estimated that monthly savings of $2,029 in formal services are possible if disease progression can be slowed. Annual institutional cost savings of $9,132 also are achievable if alternative residential settings are used.

Recent studies have estimated the costs attributable to informal care provided by family or friends in the community. Rice and colleagues estimate that the cost of informal care for community residents was $35,000 per year, compared to $5,500 for nursing home residents. Total yearly cost of caring for AD patients was $47,000 both for community and institutionalized persons, but with large differences in the proportion of care that was informal (12% for those in nursing homes, 73% for community dwellers). (Rice, DP, et al. Health Affairs 12: 164-176, 1993).

10. Commentary:

Economic consequences of Alzheimer's disease such as direct medical and nonmedical expenditures by patients' families and the amount of time spent by third parties in caring for patients with dementia are substantial. However, little systematic accounting to estimate these consequences has been undertaken. More recent analyses point out the need for a reevaluation of the cost estimates for AD and related dementias.

The National Institute on Aging's Alzheimer's Disease Education and Referral Center (ADEAR) provides patients, their families, and the general public with the latest information on Alzheimer's disease. The ADEAR center is available on the internet at http://www.alzheimers.org.

Arthritis

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 64.8 billion
Estimated Direct Cost	$ 15.2 billion
Estimated Indirect Cost	$ 49.6 billion
Reference Year	1992
IC Providing the Estimate	NIAMS
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	4%

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 098.5, 274.0, 711-720.
3. Estimate Includes Costs:

Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No

4. Population Base for Cost Estimate (Total U.S. pop. or other) Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost: Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other) Total Society
7. Approach to Estimation of Indirect Costs Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

Yelin E, and Callahan L for the National Arthritis Data Work Group: The economic cost and social and psychological impact of musculoskeletal conditions, Arthritis and Rheumatism 1995, 38:10:1351-1362

Allan Praemer, Sylvia Furner, and Dorothy P. Rice. *Musculoskeletal Conditions in the United States,* Park Ridge, IL, American Academy of Orthopaedic Surgeons, 1992, p. 165, Table 15.

9. Other Indicators of Burden of Disease:

Currently, arthritis in some form affects nearly 40 million Americans--one in seven. By the year 2020, as Baby Boomers reach their 60s, arthritis will affect almost 60 million--nearly one in five--according to a study released last June (1994) by the National Arthritis Data Workgroup.

10. Commentary:

The estimate by Praemer, Furner and Rice refers to 1988. Yelin and Callahan express the results in 1992 dollars by using the Consumer Price Index (CPI). They state that the adjustment provides conservative estimates of costs, because the medical care component of the COI has been rising much faster than the other components of the CPI. The adjustment implicitly assumes no change in practice patterns.

According to author/economist Ed Yelin, indirect cost estimates would be much greater if the costs attributed to loss of homemaking functions could be more easily priced in the marketplace.

Asthma

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 14 billion
Estimated Direct Cost	$ 12 billion
Estimated Indirect Cost	$ 2 billion
Reference Year	1996
IC Providing the Estimate	NIAID
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	Yes
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	Not Available

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 493.

3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

Farquhar I et al, Cost estimates for environmentally related asthma; Research in Human Capital and Development, Vol. 12, 1998, pp. 35-46.

9. Other Indicators of Burden of Disease:

In 1994, there were 14.6 million persons (5.6%) in the United States who had asthma and more than 451,000 hospitalizations were attributed to asthma as the first-listed diagnosis. Of those hospitalizations, 169,000 were recorded for children less than 15 years of age. In 1994, asthma accounted for more than 134 million days of restricted activity and 64 million days of bed disability (National Health Interview Survey, 1994).

Although asthma deaths are infrequent for all ages, the asthma mortality rate has followed an unusual pattern. The mortality rate fell dramatically from the 1960's to the late 1970's, from 28.2/1,000,000 in 1960-62 to 8.2/1,000,000 in 1975-78. Since then, mortality has more than doubled to 17.9/1,000,000 in 1993-95. Among 0-24 year olds, asthma deaths have increased

118% between 1980 and 1993 (MMWR 45:353-3, 1996).

Asthma is more prevalent among African Americans than whites. In 1993, among 0-24 year olds, African Americans were 3-4 times more likely to be hospitalized for asthma and 4-6 times more likely than whites to die of asthma (MMWR 45:353-3, 1996).

10. Commentary:

Farquhar, et al replaces the previous report by Weiss[1], et al due to rapid growth in the prevalence of asthma and changes in the structure of health care utilization since the mid 1980's. The disease prevalence has been varying by age groups. The rates of particular types of medical care utilization vary by age groups as well. For example in 1987, almost 31% of all hospital and emergency care were attributed to those under 17, while in 1996 this number fell to 20% for this age group. Among those over 65 years old, hospital and emergency care utilization went from 56% in 1987 to 43% in 1996.

In the report by Farquar et al, the 1987 National Medical Expenditure Survey (NMES) was used as a single data source for constructing cost estimates. Data on asthma-related health care utilization (NMES 1987), data on asthma prevalence in 1988 and 1992 (Prevalence of Selected Chronic Conditions 1993 and 1997 respectively), and rates of ambulatory care, hospitalization, and emergency care (Dr. David Mannino, NCEH/CDC) were used to estimate asthma-related health care utilization in 1996. The diagnosis-specific expenditure model (DSME) was used to estimate the 1987 asthma prevalence, diagnosis specific medical expenses by categories of care and by sources of payment. The total direct cost was determined by combining the totals for each health care category.

[1]Weiss KB, Gergen PJ, Hodgson TA. An economic evaluation of asthma in the United States. *NEJM*. 326(13):862-866, 1992.

Atherosclerosis

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 6.2 billion
Estimated Direct Cost	$ 5.5 billion
Estimated Indirect Cost	$ 0.7 billion
Reference Year	1999
IC Providing the Estimate	NHLBI
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	6 %

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 440.

3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate

Unpublished. Contact Mr. Thomas Thom, NHLBI, 301-435-0710.

9. Other Indicators of Burden of Disease

The meaning of the term "atherosclerosis" as used here is confined to peripheral atherosclerotic disease, i.e. not involving the heart (coronary heart disease) or brain (cerebrovascular disease). It is estimated that in 1995, over 2 million persons had peripheral atherosclerosis. In 1998, it was the 14th leading cause of death.

10. Commentary

Direct costs by type of cost for total cardiovascular diseases in 1997 were estimated by Tom Hodgson (National Center for Health Statistics) in a report to be published. He used a variety of survey data from NCHS and the Health Care Financing Administration, and elsewhere. Atherosclerosis costs for 1997 are estimated by applying to Hodgson's total cardiovascular disease costs the proportion that atherosclerosis is of total cardiovascular diagnoses for: a)

hospital days, b) physician office vists, c) drug mentions in physician visits, d) home health care discharges, and e) nursing home discharges as reported in the latest NCHS surveys. HCFA estimated expenditures for personal health care increased 10% from 1995 ($879.3 billion) to 1997 ($969.0 billion). This increase was appled to the 1997 direct cost estimate for atherosclerosis , giving an estimate for 1999. Only the primary diagnosis of atherosclerosis reported in the surveys was considered. Allocating costs according to the primary diagnosis eliminated overlap with other diseases. Costs associated with atherosclerosis as a comorbid condition to some other primary diagnosis were not included. Costs incurred by family or other personal caregivers for atherosclerosis patients cannot be estimated and were not included. The national health expenditures that cannot be allocated to diseases (e.g. construction and research) were not included in the atherosclerosis direct costs.

Indirect morbidity cost of atherosclerosis could not be estimated. The indirect mortality cost in 1997 represents lost productivity based on lost earnings attributed to premature deaths from atherosclerosis in that year. It was estimated by applying the numbers of atherosclerosis deaths in 1997, by age and sex, reported from national vital statistics, to the age-sex estimates of the present value of lifetime earnings discounted at six percent. These lifetime values were estimated for 1997 by Wendy Max and Dr. Dorothy Rice (University of California, San Francisco). They are not published. These estimates were obtained by personal communication. Those values were inflated to 1999 using an inflation factor (10%) based on mean annual wages of year-round full time workers reported for 1995 and 1997 by the Bureau of the Census. Atherosclerosis deaths in 1997 were those where atherosclerosisis was the underlying cause of death regardless of what other contributing causes may have been present. Other deaths, where atherosclerosis was a contributing cause, were not included. The accuracy of estimates of the present value of lifetime earnings has not been assessed by anyone at NHLBI; estimates were taken at face value.

Cancer (Malignant Neoplasms)

Summary of Methods and Data for Estimates of Cost of Illness

1. Estimated Total Economic Cost	$ 96.1 billion
Estimated Direct Cost	$ 27.5 billion
Estimated Indirect Cost	$ 68.7 billion
Reference Year	1990
IC Providing the Estimate	NCI
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	4 %

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 140(4)-208.
3. Estimate Includes Costs:

Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No

4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total society
7. Approach to Estimation of Indirect Costs	Human capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

Brown ML, Fintor L. The economic burden of cancer. In Greenwald P, Kramer BS, Weed DL, eds. Cancer Prevention and Control. New York: Marcel Dekker, Inc., 1995 pp. 69-81.

9. Other Indicators of Burden of Disease:

In 1999, the estimated number of new cancer cases is expected to be 1,221,800, and an estimated 563,100 deaths from cancer are expected (1). In 1995 an estimated 8.2 million person-years of life were lost due to premature mortality from cancer (2). In 1990, the reference year for the cost estimates, there were an estimated 1,040,000 new cases of cancer, an estimated 505,295 deaths were due to cancer, and an estimated 7.8 million person-years of life were lost because of premature mortality due to cancer. The following URLs provide additional information on cancer incidence and death rates: http://www.seer.ims.nci.nih.gov/; http://dccps.nci.nih.gov/DCCPS; http://jnci.oupjournals.org/cgi/content/full/91/8/675)

10. Commentary:

Malignant neoplasms excludes basal and squamous cell skin and in situ carcinomas except urinary bladder. This estimate is an update of an estimate by Rice et al. (3) of the economic burden of cancer in 1985. Two basic adjustments are applied to update the estimates from 1985 to 1990. First, the overall burden of disease is adjusted by using data on cancer incidence from the National Cancer Institute's Surveillance, Epidemiology and End Results (SEER) program and cancer mortality data from the National Center for Health Statistics. Second, cost per case is adjusted for using appropriate indicators of inflation. In the case of direct costs, the inflation in cancer care costs was adjusted by using the Fixed Weight Price Index of the Health Care Financing Administration. In the case of indirect cost the "human capital" costs of morbidity and mortality were adjusted using the average value of wage earnings from the U.S. Bureau of Labor Statistics. [For more details on methods and data sources see reference (4).] This estimate is similar, but not identical to, the result reported in Brown (5) which used similar methods but somewhat different adjustment factors.

References

1. Cancer Facts & Figures-1999. American Cancer Society, Atlanta Georgia, 1999. Excludes basal and squamous cell skin and in situ carcinomas except urinary bladder. Incidence projections are based on rates from the NCI SEER Program 1979-1995.

2. Ries LAG, Kosary CL, Hankey BF, Harras A, Miller BA, Clegg L, Edwards BK (eds). SEER Cancer Statistics Review, 1973-1996: Tables and Graphs, National Cancer Institute. Bethesda, MD, NIH Publ. No.99-2789;1999

3. Rice DP, Hodgson TA, Capell F. The economic burden of cancer, 1985: United States and California. In Sheffler RM, Andrews NC, eds. Cancer Care and Costs. Ann Arbor, Mich: Health Administration Press, 1989, pp. 39-59.

4. Brown ML, Fintor L. The economic burden of cancer. In Greenwald P, Kramer BS, Weed DL, eds. Cancer Prevention and Control. New York: Marcel Dekker, Inc., 1995, pp. 69-81.

5. Brown ML. The national economic burden of cancer. Journal of the National Cancer Institute. 1990;82:1811-1814.

Cancer - Breast

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$12.7 billion
Estimated Direct Cost	$ 6.6 billion
Estimated Indirect Cost	$ 6.2 billion
Reference Year	1990
IC Providing the Estimate	NCI
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	4 %
2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 174-175.	
3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

Brown ML, Fintor L. The economic burden of cancer. In Greenwald P, Kramer BS, Weed DL, eds. Cancer Prevention and Control. New York: Marcel Dekker, Inc., 1995 pp. 69-81.

9. Other Indicators of burden of disease:

In 1999, the estimated number of new breast cancer cases is expected to be 176,300, and the number of deaths is estimated at 43,700. (1). In 1995 an estimated 826,000 person-years of life were lost due to premature death from cancer (2). In 1990, the reference year for the cost estimates provided above, for breast cancer, there were an estimated 150,000 new cases; 43,400 deaths; and 845,000 person-years lost because of premature mortality due to this disease. The following URLs provide additional information on cancer incidence and death rates: http://www.seer.ims.nci.nih.gov/; http://dccps.nci.nih.gov/DCCPS; http://jnci.oupjournals.org/cgi/content/full/91/8/675

10. Commentary:
These estimates were generated by combining estimates of the average life-time cost of cancer for specific organ sites with data on cancer incidence and survival from the National Cancer Institute's Surveillance, Epidemiology and End Results (SEER) program. Primary data on average life-time costs were derived from Medicare claims records for cancer cases diagnosed between 1974 and 1981. Costs were updated to 1990 using the Fixed Weight Price Index from the Health Care Finance Administration.

References

1. Cancer Facts & Figures-1999. American Cancer Society.

2. Ries LAG, Kosary CL, Hankey BF, Harras A, Miller BA, Clegg L, Edwards BK (eds). SEER Cancer Statistics Review, 1973-1996: Tables and Graphs, National Cancer Institute. Bethesda, MD, NIH Publ. No. 99-2789; 1999.

Cancer - Cervical

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	Not Available
Estimated Direct Cost	$ 0.6 billion
Estimated Indirect Cost	Not Available
Reference Year	1990
IC Providing the Estimate	NCI
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	No
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	Not Available

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 180.

3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

Brown, ML, Fintor L. The economic burden of cancer. In Greenwald P, Kramer BS, Weed DL, eds. Cancer Prevention and Control. New York: Marcel Dekker, Inc., 1995 pp. 69-81.

9. Other Indicators of Burden of Disease:

In 1999, the estimated number of new cervical cancer cases is expected to be 12,800, and 4,800 deaths are expected from this disease (1). In 1995 an estimated 117,000 person-years of life were lost due to premature mortality from cervical cancer (2). In 1990, the reference year for the cost estimates described above, for cervical cancer, there were an estimated 13,500 new cases; 4,600 deaths; and 116,000 person-years lost because of premature mortality due to this disease. The following URLs provide additional information on cancer incidence and death rates: http://www.seer.ims.nci.nih.gov/; http://dccps.nci.nih.gov/DCCPS; http://jnci.oupjournals.org/cgi/content/full/91/8/675

10. Commentary:

These estimates were generated by combining estimates of the average life-time cost of cancer for specific organ sites with data on cancer incidence and survival from the National Cancer Institute's Surveillance, Epidemiology and End Results (SEER) program. Primary data on average life-time costs were derived from Medicare claims records for cancer cases diagnosed between 1974 and 1981. Costs were updated to 1990 using the Fixed Weight Price Index from the Health Care Finance Administration.

References

1. Cancer Facts & Figures-1999. American Cancer Society.

2. Ries LAB, Kosary CL, Hankey BF, Harras A, Miller BA, Clegg L, Edwards BK (eds). SEER Cancer Statistics Review, 1973-1996: Tables and Graphs, National Cancer Institute. Bethesda, MD, NIH Publ. No. 99-2789;1999.

Cancer - Colorectal

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	Not Available
Estimated Direct Cost	$ 6.5 billion
Estimated Indirect Cost	Not Available
Reference Year	1990
IC Providing the Estimate	NCI
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	No
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	Not Available
2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 153-154; 159.	
3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

Brown ML, Fintor L. The economic burden of cancer. In Greenwald P, Kramer BS, Weed DL, eds. Cancer Prevention and Control. New York: Marcel Dekker, Inc., 1995 pp. 69-81.

9. Other Indicators of Burden of Disease:

In 1999, the estimated number of new colorectal cancer cases is expected to be 129,400, and the estimated number of deaths from the disease is expected to be 56,600. (1). In 1995 the estimated number of person-years lost due to premature mortality from this disease was 756,000 years (2). In 1990, the reference year for the cost estimates provided above, for colorectal cancer, there were an estimated 155,000 new cases, 57,200 deaths, and 758,000 person-years lost because of premature mortality due to this disease. The following URLs provide additional information on cancer incidence and death rates: http://www.seer.ims.nci.nih.gov/; http://dccps.nci.nih.gov/DCCPS; http://jnci.oupjournals.org/cgi/content/full/91/8/675

10. Commentary:

These estimates were generated by combining estimates of the average life-time cost of cancer for specific organ sites with data on cancer incidence and survival from the National Cancer Institute's Surveillance, Epidemiology and End Results (SEER) program. Primary data on average life-time costs were derived from Medicare claims records for cancer cases diagnosed between 1974 and 1981. Costs were updated to 1990 using the Fixed Weight Price Index from the Health Care Finance Administration.

References

1. Cancer Facts & Figures-1999. American Cancer Society.

2. Ries LAG, Kosary CL, Hankey BF, Harras A, Miller BA, Clegg L, Edwards BK (eds). SEER Cancer Statistics Review, 1973-1996: Tables and Graphs, National Cancer Institute. Bethesda, MD, NIH Publ. No. 99 – 2789:1999.

Cancer - Lung

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	Not Available
Estimated Direct Cost	$ 5.1 billion
Estimated Indirect Cost	Not Available
Reference Year	1990
IC Providing the Estimate	NCI
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	No
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	Not Available

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 162.2-162.9.
3. Estimate Includes Costs:

Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No

4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

Brown ML, Fintor L. The economic burden of cancer. In Greenwald P, Kramer BS, Weed DL, eds. Cancer Prevention and Control. New York: Marcel Dekker, Inc., 1995 pp. 69-81.

9. Other Indicators of Burden of Disease:

In 1999, it is estimated that there will be 171,600 new lung cancer cases diagnosed, and an estimated 158,900 deaths are expected (1). The estimated number of person-years lost due to premature mortality from this disease in 1995 was 2,236,000 (2). In 1990, the reference year for the cost estimates provided above, for lung cancer, there were an estimated 157,000 new cases; 141,100 deaths; and 2,136,000 person-years lost because of premature mortality due to this disease. The following URLs provide additional information on cancer incidence and death rates: http://www.seer.ims.nci.nih.gov/; http://dccps.nci.nih.gov/DCCPS; http://jnci.oupjournals.org/cgi/content/full/91/8/675

10. Commentary:

These estimates were generated by combining estimates of the average life-time cost of cancer for specific organ sites with data on cancer incidence and survival from the National Cancer Institute's Surveillance, Epidemiology and End Results (SEER) program. Primary data on average life-time costs were derived from Medicare claims records for cancer cases diagnosed between 1974 and 1981. Costs were updated to 1990 using the Fixed Weight Price Index from the Health Care Finance Administration.

References

1. Cancer Facts & Figures-1999. American Cancer Society.

2. Fries LAG, Kosary CL, Hankey BF, Harras A, Miller BA, Clegg L, Edwards BK (eds). SEER Cancer Statistics Review, 1973-1996: Tables and Graphs, National Cancer Institute. Bethesda, MD, NIH Publ. No. 99-2789:1999.

Cancer – Ovarian

Summary of Methods and Data for Estimates of Costs of Illness

1. Estimated Total Economic Cost	Not Available
Estimated Direct Cost	$ 0.9 billion
Estimated Indirect Cost	Not Available
Reference Year	1990
IC Providing the Estimate	NCI
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	No
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	Not Available
2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 183.	
3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

Brown ML, Fintor L. The economic burden of cancer. In Greenwald P, Kramer BS, Weed DL, eds. Cancer Prevention and Control. New York: Marcel Dekker, Inc., 1995 pp. 69-81.

9. Other Indicators of Burden of Disease:

In 1999, the estimated number of new ovarian cancer cases is expected to be 25,200, and the number of deaths is estimated at 14,500 (1). The estimated number of person-years lost from ovarian cancer in 1995 was estimated at 227,000 (2). In 1990, the reference year for the cost estimates provided above, there were an estimated 20,500 new cases of ovarian cancer. There were 12,566 deaths from ovarian cancer in 1990, and an estimated 221,000 person-years of life were lost because of premature mortality due to ovarian cancer. The following URLs provide additional information on cancer incidence and death rates: http://www.seer.ims.nci.nih.gov/; http://dccps.nci.nih.gov/DCCPS; http://jnci.oupjournals.org/cgi/content/full/91/8/675

10. Commentary:

These estimates were generated by combining estimates of the average life-time cost of cancer for specific organ sites with data on cancer incidence and survival from the National Cancer Institute's Surveillance, Epidemiology and End Results (SEER) program. Primary data on average life-time costs were derived from Medicare claims records for cancer cases diagnosed between 1974 and 1981. Costs were updated to 1990 using the Fixed Weight Price Index from the Health Care Finance Administration.

References

1. Cancer Facts & Figures-1999. American Cancer Society.

2. Ries LAG, Kosary CL, Hankey BF, Harras A, Miller BA, Clegg L, Edwards BK (eds). SEER Cancer Statistics Review, 1973-1996: Tables and Graphs, National Cancer Institute. Bethesda, MD, NIH Publ. No. 99-2789; 1999.

Cancer – Prostate

Summary of Methods and Data for Estimates of Costs of Illness

1. Estimated Total Economic Cost	Not Available
Estimated Direct Cost	$ 4.7 billion
Estimated Indirect Cost	Not Available
Reference Year	1990
IC Providing the Estimate	NCI
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	No
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	Not Available
2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 185.	
3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

Brown ML, Fintor L. The economic burden of cancer. In Greenwald P, Kramer BS, Weed DL, eds. Cancer Prevention and Control. New York: Marcel Dekker, Inc., 1995 pp. 69-81.

9. Other Indicators of Burden of Disease:

In 1999, the estimated number of new prostate cancer cases is expected to be 179,300, and the number of deaths is estimated at 37,000 (1). An estimated 311,000 person-years of life were lost in 1995 due to premature mortality from prostate cancer (2). In 1990, the reference year for the cost estimates provided above, for prostate cancer, there were an estimated 106,000 new cases; 32,400 deaths; and 306,000 person-years lost because of premature mortality due to this disease. The following URLs provide additional information on cancer incidence and death rates: http://www.seer.ims.nci.nih.gov/; http://dccps.nci.nih.gov/DCCPS; http://jnci.oupjournals.org/cgi/content/full/91/8/675

10. Commentary:

These estimates were generated by combining estimates of the average life-time cost of cancer for specific organ sites with data on cancer incidence and survival from the National Cancer Institute's Surveillance, Epidemiology and End Results (SEER) program. Primary data on average life-time costs were derived from Medicare claims records for cancer cases diagnosed between 1974 and 1981. Costs were updated to 1990 using the Fixed Weight Price Index from the Health Care Finance Administration.

References

1. Cancer Facts & Figures-1999. American Cancer Society.

2. Ries LAG, Kosary CL, Hankey BF, Harras A, Miller BA, Clegg L, Edwards BK (eds). SEER Cancer Statistics Review, 1973-1996: Tables and Graphs, National Cancer Institute. Bethesda, MD, NIH Publ. No. 99-2789;1999.

Cerebrovascular Disease (Stroke)

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 43.3 billion
Estimated Direct Cost	$ 28.3 billion
Estimated Indirect Cost	$ 15.0 billion
Reference Year	1998*
IC Providing the Estimate	NINDS
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	6 %

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 430-438 (2).

3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate:

National Center for Health Statistics, Centers for Disease Control and Prevention (Thomas A. Hodgson), and National Heart, Lung, and Blood Institute, NIH (Thomas J. Thom).

9. Other Indicators of Burden of Disease:

Incidence: Greater than 700,000 per year. This estimate, which is an increase of 200,000 from earlier estimates, reflects an older, more diverse population. Broderick, J., Brott, T., Kothari, R., Khoury, J., Pancioli, A., Gebel, J., Mills, D., Minneci, L., and Shukla, R. "The Greater Cincinnati/Northern Kentucky Stroke Study: Preliminary and First-Ever and Total Incidence Rates of Stroke Among Blacks." *Stroke* vol.29, pps.415-21, 1998
Prevalence: 3.9 million

Stroke is the third leading cause of death in the U.S. ($\geq$ 150,000 per year)

10. Commentary:

These data are consistent with extrapolations from the Framingham Heart Study base data, and with information promulgated by the American Heart Association.

*Reference year is displayed as ‘1998’ only for consistency with other reports which project these cost estimates onto 1998 using inflationary and other factors applied to the results of studies on earlier years’ costs.

Chronic Liver Disease and Cirrhosis

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost $ 3.2 billion
   Estimated Direct Cost $ 1.2 billion
   Estimated Indirect Cost $ 2.1 billion
   Reference Year 1985
   IC Providing the Estimate NIDDK

   Direct Costs Include: Other related nonhealth costs No
   Indirect Costs Include:
   - Mortality costs Yes
   - Morbidity costs: Lost workdays of the patient Yes
   - Morbidity costs: Reduced productivity of the patient No
   - Lost earnings of unpaid care givers No
   - Other related nonhealth costs No

   Interest Rate Used to Discount Out-Year Costs 4 %
2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 570-573.
3. Estimate Includes Costs:
   - Of related conditions beyond primary, strictly coded ICD-9-CM category Yes
   - Attributable to the subject disease as a secondary diagnosis Yes, but only partly
   - Of conditions for which the subject disease is an underlying cause No
4. Population Base for Cost Estimate (Total U.S. pop or other) Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost: Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other) Total Society
7. Approach to Estimation of Indirect Costs Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

See digestive diseases.

9. Other Indicators of Burden of Disease:

See digestive diseases.

10. Commentary:

See digestive diseases.

Chronic Obstruction and Pulmonary Diseases and Allied Conditions

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 37.3 billion
Estimated Direct Cost	$ 21.6 billion
Estimated Indirect Cost	$ 16.2 billion
Reference Year	1998
IC Providing the Estimate	NHLBI
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	6 %

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 490-496.
3. Estimate Includes Costs:

Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No

4. Population Base for Cost Estimate (Total U.S. pop or other) — Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost: — Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other) — Total Society
7. Approach to Estimation of Indirect Costs — Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

The Morbidity and Mortality Chartbook on Cardiovascular, Lung, and Blood Diseases, 1996, National Heart, Lung, and Blood Institute, May 1996 has cost estimates for 1993. The next Chartbook is due June 1998 and will have cost estimates for 1998.

9. Other Indicators of Burden of Disease:

This disease group is the fourth leading cause of death. Included are chronic bronchitis, asthma, and emphysema; present in 14 million, 15 million, and 2 million persons respectively, in 1995.

10. Commentary:

Direct costs by type of cost for total respiratory diseases in 1995 were estimated by Tom Hodgson (National Center for Health Statistics) in a report to be published. He used a variety of survey data from NCHS and the Health Care Financing Administration, and elsewhere. COPD

and Allied Diseases costs for 1995 are estimated by applying to Hodgson's total respiratory costs the proportions that COPD are of total respiratory diagnoses for: a) hospital days, b) physician office vists, c) drug mentions in physician visits, d) home health care discharges, and e) nursing home discharges as reported in the latest NCHS surveys. From the NCHS publication "Health, US 1996-97", total personal health expenditures increased 19% from $740.5 billion in 1992 to $878.8 bilion in 1995. COPD costs for 1995 were increased by that same percentage to estimate the cost in 1998. Only the primary diagnosis of COPD reported in the surveys was considered. Allocating costs according to the primary diagnosis eliminated overlap with other diseases. Costs associated with COPD as a comorbid condition to some other primary diagnosis were not included. Costs incurred by family or other personal caregivers for COPD patients cannot be estimated and were not included. The national health expenditures that cannot be allocated to diseases (e.g. construction and research) were not included in the COPD direct costs.

The indirect morbidity cost of COPD represents lost earnings from lost work days due to COPD illness, i.e. lost productivity in 1998. Four groups of persons are included: a) labor force, b) institutionalized c) homemakers, and d) persons unable to work. An estimate of cost of total respiratory diseases in 1980 was made by the National Center for Health Statistics. From that an estimate for COPD was derived. That estimate has been adjusted by a 1980-1998 inflation factor derived from mean earnings of full-time year-around workers as reported by the Bureau of the Census and extrapolated to 1998.

The indirect mortality cost of COPD in 1998 represents lost productivity based on lost earnings attributed to premature deaths from COPD in that year. It was estimated by applying the numbers of COPD deaths in 1996, by age and sex, reported from national vital statistics, to the age-sex estimates of the present value of lifetime earnings discounted at six percent. These lifetime values were estimated for 1992 by Dr. Dorothy Rice (University of California, San Francisco). They are not published. Those values were inflated to 1998 using the inflation factors mentioned above. COPD deaths in 1996 were those where COPD was the underlying cause of death regardless of what other contributing causes may have been present. Other deaths, where COPD was a contributing cause, were not included. The accuracy of estimates of the present value of lifetime earnings has not been assessed by anyone at NHLBI; estimates were taken at face value.

Dental/Oral Diseases

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	Not Available
Estimated Direct Cost	$ 50.6 billion
Estimated Indirect Cost	Not Available
Reference Year	1997
IC Providing the Estimate	NIDCR
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	No
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	Not Available
2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 520(3)-529.	
3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Not Available

8. Source of Cost Estimate:

Health Care Financing Administration (HCFA), Office of the Actuary, National Health Statistics Group: National Health Expenditures. Data reported here current as of 12/99.

Methodologic details are given in: National Health Accounts: Lessons from the U.S. Experience, available at http://www.hcfa.gov/stats/nhe-oact/lessons/httoc.htm

9. Other Indicators of Burden of Disease:

Despite remarkable improvements in the oral health of the U.S. population, dental and oral diseases remain widespread. Dental caries can be found in 84 percent of children by age 17, 96 percent of adults, and 99.5 percent of those above the age of 65. Periodontal diseases and other oral conditions affect almost every U.S. resident and over 17 million have lost all their teeth. Oropharyngeal cancer is estimated to result in more than 29,000 new cases and 8,000 deaths per year.

10. Commentary:

As noted above, the cost of illness estimate for Dental/Oral Diseases is based on an estimate of national expenditures for dental services computed by the Health Care Financing Administration (HCFA). Note that the costs reported here are direct costs only - indirect costs are not included.

Diabetes

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost (See Commentary)	$ 98.2 billion
Estimated Direct Cost (See Commentary)	$ 44.1 billion
Estimated Indirect Cost	$ 54.1 billion
Reference Year	1997
IC Providing the Estimate	NIDDK
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	Yes
Lost earnings of unpaid care givers	No
Other related nonhealth costs	Yes
Interest Rate Used to Discount Out-Year Costs (Lifetime Incidence Model)	4%

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 250(1).
3. Estimate Includes Costs:

Of related conditions beyond primary, strictly coded ICD-9-CM category	Yes
Attributable to the subject disease as a secondary diagnosis	Yes
Of conditions for which the subject disease is an underlying cause	Yes

4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

1) American Diabetes Association, Economic Consequences of Diabetes Mellitus in the U.S. in 1997. Diabetes Care 1998;21(2):296-309.
2) Diabetes in America, 2nd. Edition, NIDDK 1995.
3) Hodgson TA and Cohen MA, Medical Care Expenditures for Diabetes, Its Chronic Complications, and Its Comorbidities. *Preventive Medicine* 1999;29:173-86.
Note: This new study uses a different methodology to derive the cost of illness estimate, but produces results quite close to the ADA estimate.

9. Other Indicators of Burden of Disease:

--Total prevalence of known, diagnosed diabetes in 1997 is estimated to be 8-10 million; prevalence of undiagnosed diabetes is estimated to be 4-5 million. An additional 13 million persons are estimated to have impaired fasting glucose and 21 million to have impaired glucose tolerance.

--Non-insulin-dependent diabetes affects U.S. minority groups disproportionately, with rates in blacks being 1.6 times as high as in whites, rates in Hispanics 2-3 times as high, and rates in American Indians up to 7 times as high.

--Insulin-dependent diabetes is the most common chronic disease in children in the U.S., affecting about one in every 400-500 children.

--Diabetes is the leading cause of blindness, renal disease, and nontraumatic amputations in the U.S.

--Patients with diabetes are 2 to 6 times more likely to have heart disease than people without diabetes. Rates of stroke, peripheral vascular disease, and neuropathy are similarly elevated.

--Rates of disability are 2 to 3 times those of the nondiabetic population.

--About 6 percent of people with known diabetes die each year, including 14 percent of those age 75 years or older. These rates are substantially greater than mortality rates in the general U.S. population.

10. Commentary:

The figures recommended for use by NIDDK are taken directly from the most recent cost of illness study sponsored by the American Diabetes Association. These figures incorporate significant changes in the healthcare system (reduced hospitalizations) and a greater burden of disability due to diabetes. Also, a more accurate approach is used to estimate costs attributable to diabetes.

Digestive Diseases

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 56.2 billion
Estimated Direct Cost	$ 41.5 billion
Estimated Indirect Cost	$ 14.7 billion
Reference Year	1985
IC Providing the Estimate	NIDDK
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	4 %

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: See extended list of codes for digestive diseases in item 20 below).

3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	Yes
Attributable to the subject disease as a secondary diagnosis	Yes, but only partly
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

Broun, D.M. and Everhart, J.E., "Cost of Digestive Diseases in the United States". In Everhart J.E., ed. *Digestive Diseases in the United States: Epidemiology and Impact*. DHHS, PHS, NIH, Washington, D.C. U.S. GPO, 1994. NIH Publication No. 94-1447.

9. Other Indicators of burden of disease:

Digestive diseases are the second most costly group of diseases, accounting for about 11 percent of health care expenditures in 1985. Table 1, page X of the summary in the reference above (see attached) summarizes the Burden of Disease.

10. Commentary:

The most reliable data were derived from hospital statistics for the costs of hospital stays. Physician charges in the hospital and for office care were less reliable and less inclusive, as were

the costs of prescription and non-prescription medications. Direct costs extrapolated to 1992 were $88 billion. A “bottom-up” approach was taken in which the individual components of each digestive disease were estimated. Thus there are estimates for the cost of each disease and the area of health care in which these diseases have the greatest impact.

Extended List of ICD-9-CM Codes for Digestive Diseases:

Diagnosis	ICD-9-CM Code
Gastrointestinal Infections	01-09
Hepatitis	070
Esophageal Cancer	150
Gastric Cancer	151
Colorectal Cancer	153-154
Hepatic Cancer	155
Pancreatic Cancer	157
Other Malignancy	152, 156, 158, 159
Benign Neoplasms	211
Hemorrhoids	455
Esophageal varices	456.0-456.2
Restrictively Coded Digestive Diseases	530-579
Digestive Symptoms	787, 789

Digestive Diseases - Gallbladder

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 4.7 billion
Estimated Direct Cost	$ 4.4 billion
Estimated Indirect Cost	$ 0.4 billion
Reference Year	1985
IC Providing the Estimate	NIDDK
Direct Costs Include: Other related nonhealth costs	Yes
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	4 %

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 574-575.
3. Estimate Includes Costs:

Of related conditions beyond primary, strictly coded ICD-9-CM category	Yes
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No

4. Population Base for Cost Estimate (Total U.S. pop or other) — Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost: — Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other) — Total Society
7. Approach to Estimation of Indirect Costs — Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

See digestive diseases.

9. Other Indicators of Burden of Disease:

See digestive diseases.

10. Commentary:

See digestive diseases.

Digestive Diseases - Peptic Ulcer

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 4.92 billion
Estimated Direct Cost	$ 3.55 billion
Estimated Indirect Cost	$ 1.37 billion
Reference Year	1989 data
IC Providing the Estimate	NIDDK
Direct Costs Include: Other related nonhealth costs	Yes
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	4 %

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 531-534.
3. Estimate Includes Costs:

Of related conditions beyond primary, strictly coded ICD-9-CM category	Yes
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No

4. Population Base for Cost Estimate (Total U.S. pop or other) — Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost: — Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other) — Total Society
7. Approach to Estimation of Indirect Costs — Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

Sonnenberg A and Everhart JE, Health Impact of Peptic Ulcer in the United States. *Am. J. Gastroenterol.* 1997;92(4):614-20.

See digestive diseases.

9. Other Indicators of Burden of Disease:

See digestive diseases.

10. Commentary:

See digestive diseases.

Disability (Rehabilitation Research)

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 169.4 billion
Estimated Direct Cost	$ 82.1 billion
Estimated Indirect Cost	$ 87.3 billion
Reference Year	1986
IC Providing the Estimate	NICHD
Direct Costs Include: Other related nonhealth costs	Yes
Indirect Costs Include:	
Mortality costs	No
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	Not Available

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: No relevant code.

3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate:

Berkowitz M., Greene C., Disability Expenditures, American Rehabilitation, Spring 1989, Vol. 15, No.1, p. 7-15, 29.

Missing from this estimate was data about expenditures accrued by private organizations for services or payments to those disabled, and the person with the disability for housing, transportation and out-of-pocket expenses.

9. Other Indicators of Burden of Disease:

Not available.

10. Commentary:

Total economic costs associated with disability among persons age 18-64 in the U.S. population were obtained through a published study funded by the National Institute on Disability

Rehabilitation Research. The total cost estimate is a conservative amount derived from several sources. It is also important to know that the authors were consistent in their approach to analyzing yearly data from 1970-1986 for determining the total cost. Based on the estimated total economic losses and particular types of expenditures, the direct costs and indirect costs were derived as follows.

The estimated direct costs included $79.3 billion for *medical care expenditures* and $2.8 billion for *direct services expenditures*. Medical care expenditures were defined as funds allocated to working or non-working persons for using medical resources. Programs allocating these funds included Medicare, Department of Defense, private health insurance, Veterans Association, Workman Compensation, Medicaid, Medical vocational rehabilitation, and St. Elizabeth's Hospital. Direct service expenditures were defined as funds allocated for rehabilitation services, veterans' services for specific impairments, general federal programs, and employment assistance programs.

The estimated indirect costs included $87.3 billion for *transfer payments*. The 1986 transfer payments associated with disabilities were defined as actual funds allocated to persons unable to work because of a disability. Programs that transfer funds included Social Security Disability Insurance which covers the general working population; individual/employer insurance which a person buys or an employer provides; indemnity which a person receives if injured by another person; and income support which a person receives as a supplement if they are without sufficient resources.

Drug Abuse (including AIDS due to IV drug use)

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$109.8 billion
Estimated Direct Cost	$ 32.0 billion
Estimated Indirect Cost	$ 77.6 billion
Reference Year	1995
IC Providing the Estimate	NIDA
Direct Costs Include: Other related nonhealth costs	Yes, $20.0 billion
Indirect Costs Include:	
Mortality costs	Yes, $16.2 billion
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	Yes
Lost earnings of unpaid care givers	No
Other related nonhealth costs	Yes, $43.8
Interest Rate Used to Discount Out-Year Costs	8.6%

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification, (ICD-9-CM) for all diseases whose costs are included in this estimate: (See extended list of codes for drug abuse in item 10 below).
3. Estimate Includes Costs:

Of related conditions beyond primary, strictly coded ICD-9-CM category	Yes
Attributable to the subject disease as a secondary diagnosis	Yes
Of Conditions for which the subject disease is the underlying cause	Yes

4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5 Annual (prevalence model) or Lifetime (incidence model) Cost	Annual
6. Perspective of Cost Estimate (Total society, Federal Budget, or other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimates: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

   Harwood, H; Fountain, D; Livermore, G. The Economic Costs of Alcohol and Drug Abuse in the United States, 1992, HHS 98-4327. Report developed for the National Institute on Drug Abuse and the National Institute on Alcohol Abuse and Alcoholism, National Institutes of Health, USDHHS. Bethesda, MD: National Institutes of Health.

9. Other indicators of burden of disease:

Prevalence of drug dependence and/or addiction (1996): 13.0 million (est) (1996 National Household Survey on Drug Abuse, SAMHSA)

Death from drug induced causes in 1996 estimate: 26,272*.

*Estimate is extrapolated from the 1992, Harwood, et al. The Economic Costs of Alcohol and Drug Abuse in the United States and 1996 estimates for alcohol related deaths estimated by

NIAAA. This study reported 107,360 alcohol-attributable deaths and 25,493 drug-attributable deaths. The ratio of drug deaths to alcohol deaths is 0.237453. Applying this ratio to NIAAA's estimate of alcohol attributable deaths for 1996 (110,640) yields an estimate of drug-attributable deaths for 1996 of 26,272.

10. Commentary:

The Lewin study found that the economic cost to society from drug abuse was an estimated $97.7 billion in 1992. Since then, inflation and growth in the U.S. population have driven the economic impacts of drug abuse higher. Based on these two effects, the estimated total costs of drug abuse have been projected by Lewin to have increased by 12.5 percent between 1992 and 1995. The 1995 figures here reflect that projection.

There have been major changes in the nature of drug abuse problems in recent years since the 1985 study by Dorothy Rice and associates, the source of the previous estimate of costs of illness for drug abuse. According to recent studies, the prevalence of severe drug problems and their consequences have increased in the past ten years, notably from the epidemic of intensive/heavy cocaine use and from the increased spread of the HIV epidemic. Changes in prevalence have been associated with a material increase in drug costs. Although crime rates did not change substantially during this period, criminal justice expenditures more than doubled overall, even after adjustment for price increases. This can be attributed mainly to increases in the number of persons incarcerated. There has also been a major change in the organization and delivery of drug treatment and general health services, brought about by the influence of managed care and other changes in Medicaid, Medicare, and private insurance.

The balance of changes are due to new findings and/or methodology indicating larger impacts than previously estimated. One substantive change in the methodology has resulted in material increases in cost estimates: the inclusion of higher proportions of various health problems attributable to drug abuse and addiction.

Drug abuse disorders carry with them a number of specific, well-recognized sequelae. Among them are: health consequences and their impacts on the health care system; criminal behavior, either as a means of individual support, participation in the drug trade, or violence; and job loss, financial destitution, and subsequent reliance on society's safety nets.

Direct costs are health care expenditures (drug abuse services and care resulting from the medical consequences of use) and the costs of crime (the costs of criminal justice and drug interdiction). Indirect costs are the lost potential productivity attributed to drug abuse (premature death, institutionalization, and the consequences of being a victim of crime).

Extended List of ICD-9-CM Codes for Drug Abuse:

Diagnosis	ICD-9-CM Code
Drug psychoses	292
Drug dependence	304
Nondependent abuse of drugs	305.2-305.9

Polyneuropathy due to drugs	357.6
Narcotics affecting fetus or newborn via placenta or breast	760.72
Hallucinogens affecting fetus or newborn via placenta or breast	760.73
Drug withdrawal syndrome in newborn	779.5
Poisoning by opiates and related narcotics	965.0
Poisoning by sedatives and hypnotics	967
Poisoning by CNS muscle tone depressants	968.0
Poisoning by psychotropic agents	969
Poisoning by CNS stimulants	970
Accidental poisoning by drugs, medicaments, and biologicals	E850-858
Agricultural and horticultural chemical and pharmaceutical preparations other than plant foods and fertilizers	E863
Heroin, methadone, other opiates and related narcotics, and other drugs causing adverse effects in therapeutic use	E935.0-E935.2; E937-E940
Injury undetermined whether accidentally or purposely inflicted from poisoning by drugs, medicaments, and other	E980
Homicide and injury purposely inflicted by other persons (Age 15+)	E960-E969
Tuberculosis	010-018

Epilepsy

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	Not Available
Estimated Direct Cost	$ 3.0 billion
Estimated Indirect Cost	Not Available
Reference Year	1992
IC Providing the Estimate	NINDS
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	No
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	Not Available

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 345.

3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

NINDS Profile, 1992.

9. Other Indicators of Burden of Disease:

Incidence: 125,000 per year
Prevalence: 2.5 million

10. Commentary:

The Epilepsy Foundation of America is now concluding a 2-year study of costs associated with epilepsy. Preliminary data are currently not available.

Eye Diseases and Disorders of Vision

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 38.4 billion
Estimated Direct Cost	$ 22.3 billion
Estimated Indirect Cost	$ 16.1 billion
Reference Year	1991
IC Providing the Estimate	NEI
Direct Costs Include: Other related nonhealth costs	Yes
Indirect Costs Include:	
Mortality costs	Not available
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	Yes
Lost earnings of unpaid care givers	Not available
Other related nonhealth costs	Not available
Interest Rate Used to Discount Out-Year Costs	Not available
2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 360-379.	
3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	Not available
Attributable to the subject disease as a secondary diagnosis	Not available
Of conditions for which the subject disease is an underlying cause	Not available
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

Hu, Teh-Wei. Economic Costs of Visual Disorders and Disabilities: United States, 1982. Unpublished NEI report.

9. Other Indicators of Burden of Disease:

Thousands of Americans are blinded each year by eye diseases and disorders of vision. An estimated 1.7 million people will have some degree of visual impairment in FY 1996 as a result of age-related macular degeneration alone, and approximately 100,000 will experience a devastating, rapid loss of vision. Although vision research conducted nationally and internationally has yielded effective treatments, nearly 24,000 diabetics are blinded each year due to diabetic retinopathy. Cataract accounts for 1.3 to 1.5 million surgical procedures each year. An estimated 3 million people have glaucoma, and 120,000 are blind as a consequence. These diseases account for a significant portion of the estimated $22.3 billion in direct costs and $16.1 billion in indirect costs that visual disorders and disabilities impose on our society each

year. It should also be noted that there are an estimated 12.2 million people in the U.S. with a best corrected visual acuity of 20/40 or worse in at least one eye, and 2.3 million people over age 40 with visual impairment in both eyes.

10. Commentary:

Based on Hu's (1982) report estimating $8.6 billion as the direct cost and $6.2 billion as the indirect cost of visual disorders and disabilities in the U.S. in 1981, approximate corresponding numbers for 1991 direct cost is $22.3 billion and the indirect cost is 16.1 billion. This later estimate reflects a 10% annual increase in costs, which is in line with the actual rise in total U.S. expenditures for medical care.

Eye Diseases and Disorders of Vision - Diabetic Retinopathy

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 2.8 billion
Estimated Direct Cost	$ 0.6 billion
Estimated Indirect Cost	$ 2.2 billion
Reference Year	1992
IC Providing the Estimate	NEI
Direct Costs Include: Other related nonhealth costs	Yes
Indirect Costs Include:	
Mortality costs	Not available
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	Yes
Lost earnings of unpaid care givers	Not available
Other related nonhealth costs	Not available
Interest Rate Used to Discount Out-Year Costs	6 %

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 362.0.

3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	Not available
Attributable to the subject disease as a secondary diagnosis	Not available
Of conditions for which the subject disease is an underlying cause	Not available
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Lifetime
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

Drummond, M.F., et al. Assessing the Costs and Benefits of Medical Research: The Diabetic Retinopathy Study, 1992. Soci Sci Med, 34(9):973-981.

9. Other Indicators of Burden of Disease:

Diabetic retinopathy accounts for approximately 12 percent of new cases of blindness each year among persons aged 20-74 years in the United States. Diabetes increases the risk of blindness 25-fold over that of the general population, and it is estimated that 24,000 Americans become blind each year as a result of diabetic retinopathy.

10. Commentary:

Analysis of costs associated with blindness due to diabetic retinopathy was first reported in Drummond, Davis and Ferris study (1992). Recently the assumptions used in that study were reviewed and updated to reflect current information on treatment effectiveness of diabetic

retinopathy. This information emphasized the significant impact of clinical trials on reducing societal costs of blindness from diabetes. NEI clinical research on diabetic retinopathy has cost the American taxpayer $181 million in 1992 prices, but yields an annual societal savings of $1.2 billion to $1.6 billion. The NEI's Diabetic Retinopathy Study (DRS) and the Early Treatment of Diabetic Retinopathy Study (ETDRS) demonstrated that laser photocoagulation treatment could prevent blindness in 95% of diabetic retinopathy patients. Only an estimated 50 percent of high-risk proliferative diabetic retinopathy patients are receiving treatment, and 50% of those untreated will experience blindness within 5 years. The cost of blindness includes Social Security benefits, lost productivity, and Medicare expenditures.

Heart Diseases

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 183.1 billion
Estimated Direct Cost	$ 101.8 billion
Estimated Indirect Cost	$ 81.3 billion
Reference Year	1999
IC Providing the Estimate	NHLBI
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	6 %

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 390-398; 402; 404-429.
3. Estimate Includes Costs:

Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No

4. Population Base for Cost Estimate (Total U.S. pop or other) Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost: Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other) Total society
7. Approach to Estimation of Indirect Costs Human capital

8. Source of Cost Estimate:

The Morbidity and Mortality Chartbook on Cardiovascular, Lung, and Blood Diseases, 1998, National Heart, Lung, and Blood Institute, October, 1998 has cost estimates for 1998. The Chartbook is on the web through the NHLBI home page: http://nhlbi.nih.gov/index.htm. Estimates for 1999 appear in the American Heart Association publication: "1999 Heart and Stroke Statistical Update" released in late 1998. See AHA website: http://www.amhrt.org.

9. Other Indicators of Burden of Disease:

Heart disease is the leading cause of death in men and women. It becomes the leading cause in men by age 40. Over 21 million Americans have heart disease, of whom 5 million are limited in activity, making heart disease the third most common chronic condition, after orthopedic impairments and arthritis, causing activity limitation.

10. Commentary:

Direct cost estimates for heart disease in 1995 and 1997 were estimated by Tom Hodgson (National Center for Health Statistics) and provided to the NHLBI and the American Heart Association. Linear extrapolation of the 1995 to 1997 change to 1998 and then to 1999 was the method to estimate direct costs of heart disease for 1999. Hodgson's estimates are based on a variety of survey data from the NCHS, the Health Care Financing Administration, and elsewhere. His estimates for 1995 will appear in an NCHS report. Only the primary diagnosis of heart disease reported in the surveys was considered. Allocating costs according to the primary diagnosis eliminated overlap with non cardiovascular diseases. Costs associated with heart disease as a comorbid condition to some other primary diagnosis were not included. Costs incurred by family or other personal caregivers for heart disease patients cannot be estimated and were not included. The national health expenditures that cannot be allocated to diseases (e.g. construction and research) were not included in the heart disease direct costs.

The indirect morbidity cost of heart disease represents lost earnings from lost work days due to heart disease illness, i.e. lost productivity in 1999. Four groups of persons are included: a) labor force, b) institutionalized c) homemakers, and d) persons unable to work. An estimate of this cost for heart disease in 1980 was made by the National Center for Health Statistics. That estimate has been adjusted by a 1980-1999 inflation factor derived from mean earnings of full-time year-around workers as reported by the Bureau of the Census.

The indirect mortality cost of heart disease in 1999 represents lost productivity based on lost earnings attributed to premature deaths from heart disease in that year. It was estimated by applying the numbers of heart disease deaths in 1995, by age and sex, reported from national vital statistics, to the age-sex estimates of the present value of lifetime earnings discounted at six percent. These lifetime values were estimated for 1997 by Dr. Dorothy Rice (University of California, San Francisco) and provided to the National Heart, Lung, and Blood Institute on July 13, 1999 by Wendy Max. They are not published. Those values were inflated to 1999 using the inflation factors mentioned above. Heart disease deaths in 1995 were those where heart disease was the underlying cause of death regardless of what other contributing causes may have been present. Other deaths, where heart disease was a contributing cause, were not included. The accuracy of estimates of the present value of lifetime earnings has not been assessed by anyone at NHLBI; estimates were taken at face value.

Coronary Heart Diseases

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 99.8 billion
Estimated Direct Cost	$ 53.1 billion
Estimated Indirect Cost	$ 46.7 billion
Reference Year	1999
IC Providing the Estimate	NHLBI
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	6 %
2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 410-414.	
3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total society
7. Approach to Estimation of Indirect Costs	Human capital

8. Source of Cost Estimate:

The Morbidity and Mortality Chartbook on Cardiovascular, Lung, and Blood Diseases, 1998, National Heart, Lung, and Blood Institute, October, 1998 has cost estimates for 1998. The Chartbook is on the web through the NHLBI home page: http://nhlbi.nih.gov/index.htm. Estimates for 1999 appear in the American Heart Association publication: "1999 Heart and Stroke Statistical Update" released in late 1998. See AHA website: http://www.amhrt.org.

9. Other Indicators of Burden of Disease:

Coronary heart disease is the a leading cause of death in men and women. An estimated 12 million Americans have coronary heart disease.

10. Commentary:

Direct cost estimates for heart disease in 1995 and 1997 were estimated by Tom Hodgson (National Center for Health Statistics) and provided to the NHLBI and the American Heart

Association. Linear extrapolation of the 1995 to 1997 change to 1998 and then to 1999 was the method to estimate direct costs of coronary heart disease for 1999. Hodgson's estimates are based on a variety of survey data from the NCHS, the Health Care Financing Administration, and elsewhere. A paper with his estimates for 1995 has been submitted for publication.

Only the primary diagnosis of coronary heart disease reported in the surveys was considered. Allocating costs according to the primary diagnosis eliminated overlap with non cardiovascular diseases. Costs associated with coronary heart disease as a comorbid condition to some other primary diagnosis were not included. Costs incurred by family or other personal caregivers for coronary heart disease patients cannot be estimated and were not included. The national health expenditures that cannot be allocated to diseases (e.g. construction and research) were not included in the coronary heart disease direct costs.

The indirect morbidity cost of coronary heart disease represents lost earnings from lost work days due to coronary heart disease illness, i.e. lost productivity in 1998. Four groups of persons are included: a) labor force, b) institutionalized c) homemakers, and d) persons unable to work. An estimate of this cost for coronary heart disease in 1980 was made by the National Center for Health Statistics. That estimate has been adjusted by a 1980-1999 inflation factor derived from mean earnings of full-time year-around workers as reported by the Bureau of the Census.

The indirect mortality cost of coronary heart disease in 1999 represents lost productivity based on lost earnings attributed to premature deaths from coronary heart disease in that year. It was estimated by applying the numbers of coronary heart disease deaths in 1995, by age and sex, reported from national vital statistics, to the age-sex estimates of the present value of lifetime earnings discounted at six percent. These lifetime values were estimated for 1992 by Dr. Dorothy Rice (University of California, San Francisco) and provided to the National Heart, Lung, and Blood InstituteI on July 17, 1999. They are not published. Those values were inflated to 1998 using the inflation factors mentioned above. Coronary heart disease deaths in 1993 were those where coronary heart disease was the underlying cause of death regardless of what other contributing causes may have been present. Other deaths, where coronary heart disease was a contributing cause, were not included. The accuracy of estimates of the present value of lifetime earnings has not been assessed by anyone at NHLBI; estimates were taken at face value.

HIV/AIDS Infections

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost — $28.9 billion
   Estimated Direct Cost — $13.4 billion[2]
   Estimated Indirect Cost — $15.5 billion
   Reference Year — 1999[3]
   Office Providing the Estimate — OAR[4]

   Direct Costs Include: Other related nonhealth costs — No
   Indirect Costs Include:
   - Mortality costs — $18.4 billion
   - Morbidity costs: Lost workdays of the patient — $0.8 billion
   - Morbidity costs: Reduced productivity of the patient — Not Available
   - Lost earnings of unpaid care givers — Not Available
   - Other related nonhealth costs — Not Available

   Interest Rate Used to Discount Out-Year Costs — 3%
2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification, (ICD9-CM) for all diseases whose costs are included in this estimate:

042.x	044.x	795.71
043.x	795.8	V08.x

3. Estimate Includes Costs:
   - Of related conditions beyond primary, strictly coded ICD-9-CM category — Not Available
   - Attributable to the subject disease as a secondary diagnosis — Not Available
   - Of conditions for which the subject disease is an underlying cause — Yes
4. Population Base for Cost Estimate (Total U.S. pop. or other) — Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost: — Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other) — Total Society
7. Approach to Estimation of Indirect Costs
   Indirect costs associated with morbidity were calculated by estimating the number of days of productivity lost to illness in 1999, based on both published and unpublished data. Indirect costs associated with mortality were calculated by multiplying the most recent number of AIDS deaths (from CDC, by age category) by an estimate of future lost earnings, discounted by 3%). Age-specific productivity measures were based on calculations for 1990 by Haddix et al., adjusted for increases in earnings through1999.

8. Source of Cost Estimate: (Reference published or unpublished report, or address and

[2]The difference between the direct cost estimate in this report card and direct cost estimates included in previous versions of this report (reference year 1992) reflect estimated increases in the number of individuals with HIV infection who are receiving treatment as well as the cost of that treatment, especially the cost of highly-active anti-retroviral therapy (HAART), which was introduced in 1996. The differences in this estimate and those based directly on the HCSUS study (Bozette et al.) reflects the same factors, as well as individuals not included in the sampling frame of the HCSUS study.

[3]The estimate is expressed in 1999 dollars, based upon 1996 direct cost data from HCSUS and recent published costs of therapy; the number of persons in care for HIV infection in 1999, stratified by degree of illness, was projected from 1996 HCSUS and CDC data.

[4]The "OAR" is the Office of AIDS Research, National Institutes of Health.

telephone of person/office responsible for estimate)

Stoto, M. and Goldman, A., 1999. "Cost of Illness Estimate: HIV/AIDS." Unpublished report, The George Washington University School of Public Health and Health Services, Department of Epidemiology and Biostatistics.

9. Other Indicators of burden of disease:

International Pandemic--It should be noted that estimates of costs of illness spent in the U.S. do not adequately reflect the global burden of disease. HIV has infected more than 50 million people around the world. AIDS already has killed more than 16 million people, surpassing tuberculosis and malaria as the leading infectious cause of death worldwide, according to recent data released by the Joint United Nations Programme on HIV/AIDS (UNAIDS) and the World Health Organization (WHO). In 1999 alone, a record 2.6 million people have died -- more than in any year. HIV/AIDS has reversed decades of progress from important public health efforts to immunize children, control diseases, and improve nutrition. AIDS is lowering life expectancy and significantly affecting international businesses. Globally, HIV infection ranks 4th among all diseases as the cause of disability adjusted life years (DALY) lost. The Secretary-General of the United Nations has stated that AIDS is having an impact on the gross domestic product in some countries. The micro-economic effects of absenteeism, decline in a skilled workforce, and payments for sickness and death benefits in the developing world will lead to macro-economic effects worldwide.

The Exploding Global HIV/AIDS Pandemic

Group	People Newly Infected in 1999	People Living with HIV/AIDS	AIDS Deaths in 1999	Total AIDS Deaths
Adults	5.0 Million	32.4 Million	2.1 Million	12.7 Million
Women	*2.3 Million*	*14.8 Million*	*1.1 Million*	*6.2 Million*
Children	570,000	1.2 Million	470,000	3.6 Million
Total	5.6 Million	33.6 Million	2.6 Million	16.3 Million

The impact on developing nations is staggering, with even greater potential disaster to come. Africa has been the epicenter of HIV/AIDS globally and continues to carry the largest disease burden, with 70 percent of people living with AIDS worldwide, 83 percent of global AIDS deaths, and 95 percent of global AIDS orphans. AIDS accounts for almost 17% of DALYs lost due to all diseases in Africa--far more than any other infectious or non-infectious disease. The coexistence of other endemic diseases widely prevalent in developing countries, such as respiratory and gastrointestinal infections, complicate treatment and pose additional problems in caring for HIV-infected individuals. Of particular note is the parallel epidemic of tuberculosis in the developing world.

Shifting U.S. Demographics--In the United States, the nature of the epidemic continues to evolve. In general, the incidence of AIDS cases has declined overall, which can be attributed largely to expanded use of new antiretroviral therapies that prevent progression of HIV infection

to AIDS. Although the death rate from AIDS is declining, HIV infection rates continue to climb in a number of subpopulation groups, such as women, racial and ethnic minorities, people over 50 years of age, and those with addictive disorders, foreboding an even greater epidemic ahead. While the epidemic has stabilized among white gay men overall, recent reports indicate increasing numbers of new infections among young homosexual men.

As a result of these dynamics, more Americans are living with HIV infection than ever before. The Centers for Disease Control and Prevention (CDC) estimate that between 700,000 and 900,000 Americans are currently infected with HIV. Once again, the demographics show that racial and ethnic minorities are more heavily affected. Prevalence of AIDS is higher among African Americans and Hispanics, who account for 45 percent and 20 percent, respectively, of all persons diagnosed with AIDS during 1998. This disparity is even more striking among women, with minorities accounting for 82 percent of AIDS cases.

Infectious vs. Non-infectious Disease--The transmissible nature of HIV makes it radically different from non-transmissible diseases such as heart disease and cancer. The transmissibility of HIV--between individuals and across borders and populations--is what most defines the global pandemic and makes it imperative that the U.S. help address prevention and treatment needs worldwide. The transmissibility of the infection means that there is the potential for unlimited global spread. But it also means that, with the development of appropriate biomedical and behavioral interventions, there is the possibility for dramatic reductions in new infections--and ultimate control of the pandemic--in a way that will never be possible for noninfectious diseases.

10. Commentary

A number of published and unpublished sources of data were used in calculating the cost estimates, including unpublished data from the HIV Cost and Services Utilization Study (HCSUS) (funded through a cooperative agreement between the Agency for Health Care Policy and Research [AHCPR] and the RAND Corporation). NIH contributed funding to the study.

Direct Cost Calculation

Direct costs are calculated on the basis of actual costs of treatment, as measured by the HCSUS study (Bozette, *et al.*, 1998), extrapolated on the basis of CDC data and expert judgment. The number of persons in treatment for HIV/AIDS was calculated from HCSUS baseline data for a two month sample of persons seeking care for HIV/AIDS in early 1996, an estimated 231,400 to 300,000 individuals. Based on HCSUS information concerning treatment-seeking, this number was extrapolated to an estimated 400,000 individuals receiving care during all of 1996. Including an additional 8 percent that CDC data suggest are not covered by the HCSUS sampling frame and using CDC data on the rate of increase between 1996 and 1998 in numbers of individuals with HIV/AIDS, the estimated number of individuals receiving care for HIV/AIDS in 1999 is 621,894.

This number was then stratified by degree of illness by using a biological marker (CD4 cell count), assuming a similar distribution to the HCSUS sample data and that those new to care were less ill (higher CD4 count). To the HCSUS data for direct costs for each CD4 category was

added the net additional cost of recently-approved highly active antiretroviral therapy (HAART) for that category, based on PHS treatment guidelines ($5,000-10,000 per person). These numbers were then multiplied by the population estimates for each CD4 category to calculate the total direct cost.

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Shapiro, et al. Variations in the care of HIV-infected adults in the United States. *JAMA* 281 (24), 1999, 2305-2315.

U.S. Census Bureau. "Occupation of Longest Job – Workers (Both sexes combined) by Median and Mean Earnings 1982-1998." (Table P-44)
<http://www.census.gov/hhes/income/histinc/p44.html>

Homicide and Legal Interventions

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 33.7 billion
Estimated Direct Cost	$ 10.4 billion
Estimated Indirect Cost	$ 23.3 billion
Reference Year	1989
IC Providing the Estimate	NIMH
Direct Costs Include: Other related nonhealth costs	Yes
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	Yes
Lost earnings of unpaid care givers	No
Other related nonhealth costs	Yes
Interest Rate Used to Discount Out-Year Costs	3 %

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: E960.1; E965; E968; E968.9.
3. Estimate Includes Costs:

Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No

4. Population Base for Cost Estimate (Total U.S. pop or other) — Age 12+
5. Annual (prevalence model) or Lifetime (incidence model) Cost: — Lifetime
6. Perspective of Cost Estimate (Total society, Federal budget, or Other) — Total Society
7. Approach to Estimation of Indirect Costs — Human Capital

8. Source of Cost Estimate: T.N. Miller, M.A. Cohen, and S.B. Rossman, 1993. "Victim Costs of Violent Crime and Resulting Injuries," *Health Affairs*, Winter. (Reported estimate is derived from Table 5.)

9. Other Indicators of Burden of Disease: In 1991 homicide was the tenth leading cause of death measured by the death rate per 100,000 population.

The above-referenced article also estimates the value of non-monetary losses--pain, suffering, and lost quality of life. Non-monetary costs and lost quality of life were estimated using two techniques: jury compensation and willingness to pay. The willingness-to-pay approach values human life according to what individuals would be willing to pay for a change that reduces the probability of illness or death. The monetary value of reduced quality of life is estimated to be $145 billion in 1989, about four times more than the total direct and indirect costs estimated based on the human capital approach. Here the willingness-to-pay approach is used to complement the human-capital approach by capturing the intangible aspects (pain, suffering, etc.) of victimization. The authors combine direct, indirect, and non-monetary losses in their report, indicating that the lifetime cost of criminal victimization is $178 billion.

10. Commentary:

This estimate focuses on the lifetime costs for victims of violent crime. Crime categories include: rape, robbery, assault, arson, and murder. The estimate does not include all categories of the "Homicide and Injury Purposely Inflicted by Other Persons" section of the ICD-9 disease classification system (E960-E969).

Direct and indirect cost estimates presented were compiled by a large-scale study supported by the Department of Justice. Direct costs include costs of medical and mental health care and emergency response services, as well as insurance administration. Indirect costs include productivity loss measured by wages, fringe benefits, and value of housework. The source cited also estimates the value of pain, suffering and lost quality of life (see above).

Infertility

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	Not Available
Estimated Direct Cost	$ 1.0 billion
Estimated Indirect Cost	Not Available
Reference Year	1987
IC Providing the Estimate	NIEHS
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	No
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	Not Available

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 606, 628.
3. Estimate Includes Costs:

Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No

4. Population Base for Cost Estimate (Total U.S. pop or other) — Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost: — Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other) — Insurance companies
7. Approach to Estimation of Indirect Costs — Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

Infertility: Medical and Societal Choices, Congress of the United States, Office of Technology Assessment, Chapter 8, Pages 139-162, May 1988.

9. Other Indicators of Burden of Disease:

According to the Centers for Disease Control and Prevention 7.1 percent of married couples, or 2.1 million, were infertile in 1995 compared with 2.3 million in 1988 and 2.4 million in 1982. Nevertheless, the number of reproductive age women (60.2 million) who used some kind of infertility service in 1995 was 15 percent (9.3 million) compared to 12 percent (6.8 million) in 1988. (Source: Vital and Health Statistics Series 23, No. 19.) Although infertility itself does not represent a serious public health threat, it carries significant personal, societal, and economic consequences that call for data surveillance and action. Diagnosis and treatment of infertility are very costly, time-consuming, and invasive, and they can place immense stress on marital and family relations.

10. Commentary:

Treatments for infertility include initial diagnosis, infertility evaluations, tubal surgery, and *in vitro* fertilization (IVF). Using 1987 data, the OTA estimates the total expenditures on infertility to be the sum of the non-IVF ($935 million) and IVF ($66 million.) making the total medical expenditures on infertility to be $1.0 billion. Private insurers paid 70% of these costs and patients paid 22% out-of-pocket, with the remaider paid from other sources. OTA did not estimate other costs such as time away from work.

Injury (Total), Including Accidents and Adverse Effects

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$338 billion
Estimated Direct Cost	$89 billion
Estimated Indirect Cost	$248 billion
Estimated Quality Adjusted Life Years (QALYs) lost	13.7 million
Reference Year	1995
IC Providing the Estimate	NICHD
Direct Costs Include: Other related non-health costs	Yes
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays and fringe benefits of patient	Yes
Morbidity costs: Reduced productivity of the patient	Yes
Lost earnings of unpaid care givers	No
Other related non-health costs	No
Interest Rate Used to Discount Out-Year Costs	2.5%
2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 800-999 (E810-E949).	
3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Lifetime
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate:

Dr. Ted Miller, Children's Safety Network Economics and Insurance Resource Center, National Public Services Research Institute, Landover, Maryland, 1996, (301) 731-9891.

9. Other Indicators of Burden of Disease:

In 1995, the number of deaths from accidents and Injuries was 89,703 making this the 5th leading cause of death for all age groups. The injury rate decreased from 35.4 in 1991 to 34.1 in 1995 per 100,000 total U.S. population *CDC, MVSR, Oct 23, 1995; Vol 45(42):26*

10. Commentary:

Miller recently updated the 1989, *Cost of Injury in the U.S., Report to Congress* by Rice and colleagues. Accidents that lead to injuries represent an estimated lifetime cost of $338 billion in 1995 dollars. Including those requiring or not requiring hospitalization, costs associated with

non-fatal injuries remain a large proportion (69%) of the total lifetime cost of accidents compared to fatal injuries which represent 31%.

Rice et al. reported direct costs of injury using only costs associated with non-fatal injuries. Miller reexamined direct costs of injury associated with both, nonfatal and fatal accidents by injury mechanism and intent, then aggregated their costs. The direct cost of accidents, $89 billion, includes costs associated with emergency transportation, medical, hospital, rehabilitation, prescription, home modification, and related treatment/ancillary costs, as well as insurance administrative costs for medical claims compensation.

Indirect costs, $248 billion were computed at a 2.5% discount rate and included the victim's lost houshold work, lost wage, as well as fringe benefits based on the market value of lost work and housekeeping days due to both, fatal and non fatal accidents. All amounts were reported in 1995 dollars using the most recent incidence data from the early 1990s. These reported costs did not reflect the pain and suffering associated with injury or all of the burdens placed on the victim's family and friends, but they provided a way to quantitate the public health significance of accidents resulting in injuries.

Total quality-adjusted life-years (QALYs) associated with all injuries for all ages is 13.7 million. At a 2.5% discount rate, the QALYs can be monetized at a cost of $82,000 per QALY. (Miller) To avoid double-counting, this price is net of the productive component of the QALYs. The QALY approach follows the principles established by the Panel on Cost-Effectiveness in Health and Medicine convened by the U.S. Department of Health and Human Services (Gold et. Al. 1996) Monetization of the QALYs uses a value derived from 48 reasonably sound "willingness-to-pay" studies (Miller 1990).

Injury - Childhood Injuries Ages 0-19

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 69.6 billion
Estimated Direct Cost	$ 19.2 billion
Estimated Indirect Cost	$ 50.3 billion
Estimated Quality Adjusted Life Years (QALYs) lost	3.33 million
Reference Year	1995
IC Providing the Estimate	NICHD
Direct Costs Include: Other related nonhealth costs	Yes
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	Yes
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	2.5%
2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 800(6)-999.	
3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (Total U.S. pop or other)	< 20 years old
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Lifetime
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate:

Dr. Ted Miller, Children's Safety Network Economics and Insurance Resource Center, National Public Services Research Institute, Landover, Maryland, 1996, (301) 731-9891.

9. Other Indicators of Burden of Disease:

In 1994, accidents and injuries remained the leading cause of death among children ages 1-24. *CDC, MVSR, Oct 23, 1995; Vol 45(42):26*

10. Commentary:

Miller recently updated the 1989, *Cost of Injury in the U.S., Report to Congress* by Rice and colleagues. Accidents that lead to childhood injuries represent an estimated lifetime cost of $69 billion in 1995 dollars. Miller reexamined direct costs of childhood injury associated with both, nonfatal and fatal accidents by injury mechanism and intent, then aggregated their costs.

Different costs accrued based on gender, age, type of injury, and outcome were considered in the estimated total economic costs of childhood injuries. For example, the relative distribution of fatalities by five-year age group was used to split out costs for Rice's 15-24 age group where Rice's data were used and for poisoning (e.g. fall costs for ages 10-14 equaled fall costs for ages 5-14 multiplied by the percentage of fall fatalities of children ages 10 -14 among fall fatalities of the 5-14 year age group).

The direct cost of accidents among children ages 0-19, $89 billion, includes costs associated with emergency transportation, medical, hospital, rehabilitation, prescription, home modification, and related treatment/ancillary costs, as well as insurance administrative costs for medical claims compensation. Indirect costs, $19 billion were computed at a 2.5% discount rate. At a discount rate of 2.5%, the *human capital approach*, was used to estimate the lifetime cost of injury among persons ages 0-19. The human capital approach did not account for human suffering and pain, and reduced quality of life. Nor did the total cost include the struggle to acquire the personal, therapeutic, legal and financial aid that enables injured persons to survive and create meaningful lives in terms of work, love, mutual support, recreation and personal growth.

Total QALYs associated with all injuries for children ages 0-19 is 3.33 million. QALYs represent millions of quality-adjusted life-years discounted a 2.5% discount rate. Following Miller, the QALYs can be monetized at a cost of $82,000 per QALY. To avoid double-counting, this price is net of the productive component of the QALYs. The QALY approach follows the principles established by the Panel on Cost-Effectiveness in Health and Medicine convened by the U.S. Department of Health and Human Services (Gold et. Al. 1996). Monetization of the QALYs uses a value derived from 48 reasonably sound "willingness-to-pay" studies (Miller 1990).

Injury - Lead Poisoning

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 17.2 billion
Estimated Direct Cost	$ 11.5 billion
Estimated Indirect Cost	$ 5.7 billion
Reference Year	1994
IC Providing the Estimate	NIEHS
Direct Costs Include: Other related nonhealth costs	Yes
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	Yes
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	Not Available

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 984.
3. Estimate Includes Costs:

Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No

4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

   Swartz, J. Societal benefits of reducing lead exposure. 1994. Environmental Research. 66, 105-124.

9. Other Indicators of Burden of Disease:

According to the Centers for Disease Control and Prevention (CDC) over one million children in the U.S. have blood lead levels high enough to cause irreversible damage to their health. In 1997, the U.S. Department of Housing and Urban Development estimated that approximately 4 million homes where young children live contain lead-based paint hazards.

10. Commentary:

An estimate, according to the above reference, of 1 ug/dl reduction in blood lead concentrations will result in approximately 3200 fewer strokes per year, and 3300 fewer myocardial infarctions per year, 1300 fewer strokes per year, and 3300 fewer deaths per year. Although the percentage

of both U.S. adults and children with elevated blood lead (>10ug/dl) have been steadily decreasing since 1980, there is still a significant number of children who are at high risk for lead exposure. Children are the most vulnerable population to the detrimental health effects of lead poisoning. The high societal costs for the harm to U.S. children resulting from lead poisoning cannot be completely captured.

Injury - Trauma (Central Nervous System)

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 35.0 billion
Estimated Direct Cost	$ 10.0 billion
Estimated Indirect Cost	$ 25.0 billion
Reference Year	1992
IC Providing the Estimate	NINDS
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	No
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	Not Available

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 950-957, 054.

3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

Direct cost: *Progress and Promise*, 1992, Report of the National Advisory Neurological Disorders and Stroke Council.

Indirect cost: *The Cost of Disorders of the Brain*, 1992, The National Foundation for Brain Research (spinal cord injury only).

NINDS Profile, 1992.

9. Other Indicators of Burden of Disease:

Incidence:	Spinal cord injury -- 10,000/yr	Traumatic brain injury – 2 million/yr
Prevalence:	Spinal cord injury – 250,000	Traumatic brain injury – 1 million
Death Rate		Traumatic brain injury – ca. 100,000/yr

10. Commentary:

Some data depend heavily on extrapolations from a study by Rutgers University, 1985.

Kidney and Urologic Diseases

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 40.3 billion
Estimated Direct Cost	$ 26.2 billion
Estimated Indirect Cost	$ 14.1 billion
Reference Year	1985
IC Providing the Estimate	NIDDK
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	Yes
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	4 %

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 016.0-016.5; 016.9; 054.1; 077.8; 077.9; 078.1; 095.4; 098.0-098.3; 112.2; 131; 185; 186; 188; 189.0-189.4; 189.8-189.9; 198.0-198.1; 222.2; 223.0; 223.1; 233.4; 233.7; 233.9; 250.4; 257; 277.3; 283.1; 344.61; 403-405; 446.0; 446.4-446.6; 572.4; 580; 581; 582; 583; 584; 585; 586; 590; 591; 592; 593.3-593.5; 593.7; 594; 595; 596; 597.0; 597.8; 598; 599.0; 599.6; 599.7; 600; 601; 602; 606; 607.84; 608.85; 625.6; 642.4-642.6; 695.4; 710.0; 753.1; 788; 997.5.

3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	Yes
Of conditions for which the subject disease is an underlying cause	Yes
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

The estimate of cost for total kidney and urologic diseases is published in the National Kidney and Urologic Diseases Advisory Board's 1990 Long-Range Plan, "Window on the 21st Century", and the methodology for calculating the cost estimates is included as Appendix A of that document. The estimates were generated by a health economist (Doug Brown), using counts of hospitalization and ambulatory medical care visits due to kidney and urologic diseases reported from the following sources: a) National Hospital Discharge Survey; b) Health Care Financing Administration, Medicare provider analyses and review data, 1985 (unpublished); c) Department of Veterans Affairs, for the year ending September 30, 1986, first listed diagnoses, (unpublished); d) National Ambulatory Medical Care Survey; e)Drug Utilization in the U.S.,

1985: Seventh Annual Review (U.S.) Food and Drug Administration; f) National Center for Health Statistics: Health, United States, 1987; g) National Nursing Home Survey, 1985; h) NORC-HCFA Physicians's Practice Cost Study for 1983; I) Mortality statistics are from the US Vital Statistics records from 1985.

9. Other Indicators of Burden of Disease:

Professional and voluntary groups such as the American Society of Nephrology, the National Kidney Foundation, the Polycystic Kidney Disease Research Foundation, the American Urologic Association, the American Foundation for Urologic Research, the Interstitial Cystitis Association, etc.

10. Commentary:

Under the auspices of the Interagency Coordinating Committee, these cost estimates are currently in the process of being revised. The updated estimates will be current as of 1991, the most recent year for which data are available from all sources. The results of this effort will be available by the end of the summer of 1995. Until the update based on the 1991 data is complete, the estimates based on 1985 data represent the most comprehensive estimate of costs of nephrologic and urologic conditions available. The assignment of ICD-9 CM codes to certain disease categories will change for the 1991 cost estimates, however, for the purposes of the Cost of Illnesses draft. ICD-9 CM codes for the cost estimates by disease are listed as documented in the National Kidney and Urologic Diseases Advisory Board 's 1990 Long Range Plan.

- The costs associated with hospitalizations and ambulatory medical care visits were estimated in 1990, using 1985 national data as the source data. HCFA data on costs were used as the major indicator of costs of hospitalizations. The NORC-HCFA Physicians 's Practice Cost Study for 1983, done in 1984, was the source of estimates of costs associated with doctors visits. Costs for patients less than age 65 were assumed to be the same as those for persons over age 65.

- Direct costs are all expenses incurred at a hospital or skilled nursing facility, as well as in ambulatory care. The 1985 estimate of direct costs does not include non-prescription drugs and medical sundries. Direct hospital costs are estimated as cost per day, using the HCFA data, and data from the National Hospital Discharge Survey. Hospitalizations for which a nephrologic or urologic disease code was listed either as first mentioned, second mentioned or any mentioned were listed. Costs during those hospitalizations were weighted such that costs from hospitalizations in which a K&U disease was the primary cause were multiplied by 0.9 to get the cost due to that disease, if the K&U disease was the second mentioned, the cost was multiplied by 0.5, and if the K&U disease was mentioned in any other position, the cost of that hospitalization was multiplied by 0.05. The sum of all costs due to K&U diseases was obtained.

- The 1985 estimate of indirect costs is the estimate of value of products and services that cannot be produced due to physician visits, hospital stays, or premature death. Because

many of the patients with KU diseases are older than 65 and presumed to be retired, the impact on productivity is lower than is seen when looking at diseases from all causes.

Indirect hospitalization costs include the present value of earnings forgone for patients on hemodialysis or with kidney transplants, costs for supplies, outpatient services associated with a hospital stay, skilled nursing facilities, and home health care services associated with any given stay. Value of production foregone is calculated assuming that each person lost a day of work for each day that they were hospitalized. The number of days lost for hospitalizations with kidney and urologic diseases listed as the primary, secondary, and other diagnosis for the 65+ year age group was determined using HCFA data, then multiplied by the percent of the population employed, to estimate the actual number of days lost from work. For those less than 65 years, the National Hospital Discharge Survey was used to determine days lost. Value of production forgone in patients with ESRD was calculated using the following data and assumptions: in 1983 the employment rate of ESRD patients was 22.3% (40.3% in those with transplants), it is assumed that without the K&U disease these people would have been employed at the same rate as the general population, and it is assumed that patients with ESRD do not live the same expected lives as the general population.

- Deaths due to kidney and urologic diseases were ascertained using the ICD-9 disease codes and the Vital Statistics database. Deaths due to kidney and urologic diseases may be underestimated. This has been shown to be the case for deaths due to end-stage renal disease.

- Cost of deaths was estimated by computing the present value of the future earnings of these people. Using the 1985 employment rate and weekly earning by age and gender from the January 1986 issue of Employment and Earnings, the earnings profile was tracked over the life cycle and discounted to the present using a 4% rate of discount. Expected lives was obtained for all persons from the Bureau of the Census, and reductions in expected lives for those with kidney or urologic disease were made on a sliding scale by age. No person was assumed to work beyond age 70.

- Office visit fees are computed from the NORC-HCFA Physicians's Practice Cost Study for 1983. For each disease, the appropriate fee was chosen from kidney or urologic disease specialists, scaled by 10% to bring them to the 1995 level, and augmented to reflect the cost of ancillary services associated with the office visit, including x-rays, injections, and complete blood counts.

- Nursing home costs were estimated by evaluating those with a primary diagnosis of diseases of the genitourinary system, and patients in nursing homes who were incontinent. It was assumed that 10% of the yearly cost of being in a nursing home would be attributed to incontinence. IF kidney and urologic diseases were the primary and secondary diagnoses, 100% and 50% respectively of the nursing home charges were attributed to K&U diseases.

- Prescription drug costs were estimated using the National Prescription Audit reported in the Food and Drug Administration publications "Drug Utilization in the United States - 1985:

Seventh Annual Review, December 1986 (PB87-149902). NAMCS reported that 2.8% of drugs prescribed are K&U drugs. The average cost of drugs to treat K&U diseases was estimated by expert opinion to be $50 in 1985.

Kidney and Urologic Diseases - End-Stage Renal Disease

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	Not available
Estimated Direct Cost	$15.64 billion
Estimated Indirect Cost	Not available
Reference Year	1997
IC Providing the Estimate	NIDDK
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	Not Available
Morbidity costs: Lost workdays of the patient	Not Available
Morbidity costs: Reduced productivity of the patient	Not Available
Lost earnings of unpaid care givers	Not Available
Other related nonhealth costs	Not Available
Interest Rate Used to Discount Out-Year Costs	Not Available

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 585; 586.
3. Estimate Includes Costs:
   - Of related conditions beyond primary, strictly coded ICD-9-CM category: No
   - Attributable to the subject disease as a secondary diagnosis: No
   - Of conditions for which the subject disease is an underlying cause: No
4. Population Base for Cost Estimate (Total U.S. pop or other): Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost: Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other): Federal budget
7. Approach to Estimation of Indirect Costs: Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

U.S. RENAL DATA SYSTEM, USRDS 1999 Annual Data Report, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 1999.

9. Other Indicators of Burden of Disease:

Health Care Financing Administration Medicare ESRD Program Annual Reports

10. Commentary:

The United States Renal Data System is a database funded through a contract by NIDDK to the University of Michigan, to develop and maintain data on patients with end stage kidney disease in the United States. The USRDS database is updated yearly by the Health Care Financing Administration (HCFA) Medicare Program's Program Management and Medical Information files (PMMIS). These files contain information on age, race, gender, data of onset and cause of

of end stage renal disease, and health services utilization and cost data through the administrative billing records of dialysis unit sessions, and hospitalizations. The database is complete for approximately 93% of treated ESRD patients in the United States.

Kidney and Urologic Diseases - Incontinence (Urinary)

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 26.3 billion
Estimated Direct Cost	$ 12.5 billion
Estimated Indirect Cost	$ 13.8 billion
Reference Year	1995
IC Providing the Estimate	NIA
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	No
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	Yes
Interest Rate Used to Discount Out-Year Costs	Not used

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 788.3.
3. Estimate Includes Costs:

Of related conditions beyond primary, strictly coded ICD-9-CM category	Yes
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	Yes

4. Population Base for Cost Estimate (Total U.S. pop or other)	Age 65+
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Direct costs of related conditions

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate) Wagner, Todd H., Hu, Teh-wei, "Economic Costs of Urinary Incontinence in 1995", Urology, Vol. 51, No. 3 (1998).

9. Other Indicators of Burden of Disease:

Urinary incontinence is an important health care problem. It takes several forms and strikes for a various reasons. For example, it is often found in people with diabetes, stroke, dementia, Parkinson's disease, or multiple sclerosis. The impact of urinary incontinence is devastating. It's consequences include pressure sores, skin and urinary tract infections and falls. In addition, sufferers often experience sleep disturbances, restricted social lives, reduced sexual activity, loss of self esteem and depression. Employment may become difficult or impossible, and the burden for caregivers is substantial.

Estimates of the occurrence of urinary incontinence depend on the nature of the study population and definition of the disorder. Prevalence rates range from 8 to 51 percent; an estimate of 15 to 30 percent for community-dwelling older persons seems reasonable, and of

these, 20 to 25 percent may be classified as severe. Prevalence rates are twice as high in women as in men, and are higher in older than in younger adults. In the study cited here, it was estimated that 7.4 million elderly individuals suffered from urinary incontinence in 1995. This figure included 6.3 million community-living persons age 65+ and 1/6 million elderly living in nursing homes. At least 50% of nursing home residents are incontinent.

10. Commentary:

This estimate is based on the direct health care cost relating to urinary incontinence in 1995 prices and on the costs of direct consequential conditions. Direct health care costs of incontinence begin with diagnostic and medical evaluation, and include costs of treatment, routine care, and rehabilitation and/or therapy. Estimates for indirect costs, include treatment for skin irritation, urinary tract infections, and related falls and costs of additional admissions to institutions and increased lengths of stay in hospitals. Costs also include attributable costs of informal community caregiving.

Kidney and Urologic Diseases - Kidney Stones

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	Not Available
Estimated Direct Cost	$ 1.4 billion
Estimated Indirect Cost	Not Available
Reference Year	1985
IC Providing the Estimate	NIDDK
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	No
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	Not Available

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 592; 594.

3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	Yes
Of conditions for which the subject disease is an underlying cause	Yes
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

-National Hospital Discharge survey, 1985
-National Ambulatory Medical Care Survey, 1985
-Department of Veterans Affairs, for year ending September 30, 1986
-NORC-HCFA Physicians Practice Cost Study 1983

9. Other Indicators of Burden of Disease:

10. Commentary:

See commentary for Kidney and Urologic Diseases.

Kidney and Urologic Diseases - Prostate Diseases

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	Not Available
Estimated Direct Cost	$ 3.1 billion
Estimated Indirect Cost	Not Available
Reference Year	1985
IC Providing the Estimate	NIDDK
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	Not Available
Morbidity costs: Lost workdays of the patient	Not Available
Morbidity costs: Reduced productivity of the patient	Not Available
Lost earnings of unpaid care givers	Not Available
Other related nonhealth costs	Not Available
Interest Rate Used to Discount Out-Year Costs	4 %

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 185; 233.4; 600; 222.2; 601; 602.

3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	Yes
Of conditions for which the subject disease is an underlying cause	Yes
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

-National Hospital Discharge survey, 1985
-National Ambulatory Medical Care Survey, 1985
-Department of Veterans Affairs, for year ending September 30, 1986
-NORC-HCFA Physicians Practice Cost Study 1983

9. Other Indicators of Burden of Disease:

10. Commentary:

This estimate includes benign prostatic hyperplasia (ICD-9 CM code 600, cost $1.8 billion), prostatitis (ICD-9 CM codes 222.2, 601, 602, cost $293 million), and prostate cancer (ICD-9 CM codes 185, 233.4, cost $976 million). Also, see commentary for Kidney and Urologic Diseases.

Kidney and Urologic Diseases - Urinary Infections

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	Not Available
Estimated Direct Cost	$ 4.4 billion
Estimated Indirect Cost	Not Available
Reference Year	1985
IC Providing the Estimate	NIDDK
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	Not Available
Morbidity costs: Lost workdays of the patient	Not Available
Morbidity costs: Reduced productivity of the patient	Not Available
Lost earnings of unpaid care givers	Not Available
Other related nonhealth costs	Not Available
Interest Rate Used to Discount Out-Year Costs	4 %

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 590.0-590.2; 590.8; 590.9; 595; 599.0.

3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	Yes
Of conditions for which the subject disease is an underlying cause	Yes
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

-National Hospital Discharge survey, 1985
-National Ambulatory Medical Care Survey, 1985
-Department of Veterans Affairs, for year ending September 30, 1986
-NORC-HCFA Physicians Practice Cost Study 1983

9. Other Indicators of Burden of Disease:

10. Commentary:

See commentary for Kidney and Urologic Diseases.

Mental Disorders

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$160.8 billion
Estimated Direct Cost	$ 66.8 billion
Estimated Indirect Cost	$ 94.0 billion
Reference Year	1992
IC Providing the Estimates	NIMH
Direct Costs Include:	
Treatment Costs	$63.0 billion
Social Welfare Administration	$1.6 billion
Informal Care of Mentally Ill	$0.8 billion
Crime	$1.4 billion
Indirect Costs Include:	
Lost Productivity of Patients	$76.7 billion
Premature Death	$10.6 billion
Institutionalization of SPMI	$3.8 billion
Incarceration of Violent SPMI	$0.5 billion
Homeless SPMI	$2.3 billion
Victims of Crime	$0.1 billion
Interest Rate Used to Discount Out-Year Costs	6%

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification, (ICD-9 CM) for all diseases for which costs are included in these estimates: See extended list of codes for mental disorders in item 10 below. Note: a) alcohol and substance abuse and b) Alzheimer's disease and dementias are excluded.

3. Estimate Includes Costs:	
Of related conditions beyond the primary, strictly coded ICD-9-CM category	Yes
Attributable to the subject disease as a secondary diagnosis	Yes
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost	Annual
6. Perspective of Cost Estimate (total society, federal budget, or other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone number of person/office responsible for estimate)

Harwood, H. et al., The Economic Cost of Mental Illness, 1992. Unpublished draft report prepared for NIMH by The Lewin Group, December 1999.

9. Other Indicators of Burden of Disease:

No other indicators available at this time.

10. Commentary:

The primary source of this cost-of-illness estimate is the latest large-scale aggregate cost-of-mental-illness study, which calculated economic burden for 1992. The economic burden of only mental disorders was estimated; costs of alcohol and drug abuse or dependence were excluded. Costs for the following classes of mental disorders were also excluded: Alzheimer's disease and other degenerative cognitive disorders and mental retardation and developmental disabilities.

Direct costs include direct treatment costs in various public and private inpatient and outpatient facilities. Hospital stay costs, prescription drug costs, home health costs, nursing home costs, and the cost of visits to physicians, psychologists and social workers are included.

The reported $66.8 billion in direct costs includes treatment as well as other related costs. These costs were compiled from many sources including reports by the Bureau of the Census, the Department of Commerce, the Social Security Administration, the Department of Justice, and the Department of Labor. Costs related to mental disorders as a secondary diagnosis are included where the available data permitted. Costs related to alcohol and drug disorders as co-morbid conditions were excluded from these estimates.

Morbidity costs were derived separately for institutionalized and non-institutionalized populations. For the non-institutionalized population, a simulation model was used to estimate the value of reduced or lost productivity, using epidemiologic and economic data. Productivity losses for institutionalized individuals were estimated based on the average daily census of institutionalized persons, combined with estimates of average labor productivity for individuals of the same age and sex with no mental disorder.

Extended List of ICD-9-CM Codes for Mental Illness:

Diagnosis Included in the Study	ICD-9-CM Code
Schizophrenic Disorders	295
Affective Psychoses	296
Paranoid States	297
Other Nonorganic Psychoses	298
Psychoses with Origin Specific to Childhood	299
Neurotic Disorders	300
Personality Disorders	301
Sexual Deviations and Disorders	302
Special Symptoms or Syndromes, NEC	307
Acute Reaction to Stress	308
Adjustment Reaction	309
Specific Nonpsychotic Mental Disorders Due to Organic Brain Damage	310
Depressive Disorder, NEC	311
Disturbance of Conduct, NEC	312
Disturbance of Emotions Specific to Childhood and Adolescence	313
Hyperkinetic Syndrome of Childhood	314

Sleep Disorders	780.5
Suicide (72 percent)	950-959
Homicide (10 percent)	960-978
Child Maltreatment Syndrome	995.5
Mental/Behavioral Problems	V402-409
Other Family Circumstances	V61
Other Psychosocial Circumstances	V62
Mental Disorder Convalescence	V663
Psychiatric Follow-up	V673
Psychiatric Exam Criminal Justice Required	V701
General Psychiatric Exam, NEC	V702
Observation for Mental Conditions	V710

Diagnoses Excluded from the Study	ICD-9-CM Code
Mental Retardation and Developmental Disabilities	
Mild Mental Retardation	317
Other Specified Mental Retardation	318
Unspecified Mental Retardation	319
Specific Delays in Development	315
Dementia, Delirium, Senility, Amnesia, etc.	
Senile and Presenile Organic Psychotic Conditions	290
Transient Organic Mental Disease	293
Other Organic Psychotic Conditions (chronic)	294
Alzheimer's Disease	331
Senility without Psychosis	797
Alcohol and Drug Related Disorders	
Alcoholic Psychoses	291
Drug Psychoses	292
Alcohol Dependence Syndrome	303
Drug Dependence	304
Nondependent Abuse of Drugs	305
Other Mental Disorders	
Physiological Malfunction from Mental Factors	306
Psychic Factors Associated with Diseases Classified Elsewhere	316

Multiple Sclerosis

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 5.0 billion
Estimated Direct Cost	$ 2.5 billion
Estimated Indirect Cost	$ 2.5 billion
Reference Year	1991
IC Providing the Estimate	NINDS
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	No
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	Yes
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	Not Available

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 340.

3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

Progress and Promise, 1992. Report of the National Advisory Neurological Disorders and Stroke Council.

The Cost of Disorders of the Brain, 1992. The National Foundation for Brain Research (Washington, D.C.).

9. Other Indicators of Burden of Disease:

Incidence: ≤ 10,000 per year
Prevalence: 250,000-300,000

10. Commentary:

Incidence, prevalence, and indirect cost estimates are very conservative, since MS remains undiagnosed and unreported in many cases.

Obesity

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 99.2 billion
Estimated Direct Cost	$ 51.64 billion
Estimated Indirect Cost	$ 47.56 billion
Reference Year	1995
IC Providing the Estimate	NIDDK
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	NA

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 278.0.
3. Estimate Includes Costs:

Of related conditions beyond primary, strictly coded ICD-9-CM category	Yes
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which this disease is an underlying cause	Yes

4. Population Base for Cost Estimate (Total U.S. pop or other) — Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost: — Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other) — Total Society
7. Approach to Estimation of Indirect Costs — Human Capital

8. Source of Cost Estimate:

Wolf, AM and Colditz, G.A., "Current Estimates of the Economic Cost of Obesity in the U.S. *Obesity Research 1998; 6(2):97-106.*

9. Other Indicators of Burden of Disease:

Prevalence of obesity in America is now estimated at 33.4% of the U.S. adult population or 58 million Americans.

10. Commentary:

This Wolf and Colditz study of cost-of-illness due to obesity is an update from 1990 to 1995. Because the previous prevalence estimate of obesity in America was taken as 34 million U.S. adults, and the new one is taken as 58 million, the calculated economic costs attributable to obesity have increased substantially.

The data in both of the Wolf/Colditz studies are based on the costs attributable to obesity from

type 2 diabetes, cardiovascular disease (coronary heart disease, hypertension), gallbladder disease, cancer (breast, endometrium, colon), and osteoarthritis. Population-attributable risk percents were estimated from large prospective studies. In addition, indirect costs (excess physician visits, work-lost days, restricted activity, and bed-days attributable to obesity) were derived from the large nationally-representative National Health Interview Survey (NHIS) database. Direct costs include personal health care, hospital care, physician services, allied health services, and medications.

Osteoporosis

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	Not Available
Estimated Direct Cost	$ 13.76 billion
Estimated Indirect Cost	Not Available
Reference Year	1995
IC Providing the Estimate	NIAMS
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	No
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	Not Available

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 733.0.
3. Estimate Includes Costs:

Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No

4. Population Base for Cost Estimate (Total U.S. pop or other)	U.S. pop. 45 yrs & older
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	NA

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

Ray, NF, Chan JK, Thamer, M and Melton LJ: Medical Expenditures for the Treatment of Osteoporotic Fractures in the United States in 1995: Report from the National Osteoporosis Foundation, Journal of Bone and Mineral Research, 1997, 12:1:24-35.

9. Other Indicators of Burden of Disease:

Hip fracture is a major consequence of osteoporosis and it causes hospitalization, disability, and loss of independence for an estimated 300,000 persons in the United States annually. The great majority of these fractures occurred in people aged 50 and over. Overall, the case fatality rate for hip fracture patients within one year following the fracture is 24% and survivors frequently experience sustained disability, often leading to institutionalization. Because of the frequency of hip fracture in the fastest growing segments of the population, it is a major public health concern.

10. Commentary:

The total economic cost of osteoporosis to society is likely to be much greater than those attributed to direct medical costs alone. Direct nonmedical costs include transportation and housekeeping, while indirect costs contain loss in productivity and substantial decreases in quality of life.

Otitis Media

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 5.0 billion*
Estimated Direct Cost	$ 2.9 billion
Estimated Indirect Cost	$ 2.1 billion
Reference Years	1993
IC Providing the Estimate	NIDCD
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs include:	
Mortality costs	No
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	Yes
Other related nonhealth costs	Yes
Interest Rate Used to Discount Out-Years Costs	Not Available

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) for all diseases whose costs are included in this estimate: 381-382.
3. Estimate Includes Costs:

Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No

4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

Gates, George A., MD, FACS, Seattle, Washington. "Cost-effectiveness considerations in otitis media treatment," *Otolaryngology, Head and Neck Surgery*, April 1996; 114:525-30. NIH R01 DC01525.

Wandstrat TL, Kaplan B. West Virginia Univ. "Pharmacoeconomic impact of factors affecting compliance with antibiotic regimens in the treatment of acute otitis media," *Pediatric Infectious Disease Journal*, February 1997; 16 (2) S27-S29, Suppl.

Elden LM, Coyte PC. McMaster Univ., Canada. "Socioeconomic impact of otitis media in North America," *Journal of Otolaryngology*, 1998; 27:9-16, Suppl.2.

9. Other Indicators of Burden of Disease:

The most common cause of temporary hearing loss in children is otitis media. Eighty percent of American children have an episode of otitis media by the time they are three years of age.

According to data from the Agency for Health Care Policy and Research (AHCPR), in 1991 the annual cost of treating two-year-olds was $1 billion.

Tween DW, et al. "Epidemiology of otitis media during the first seven years of life in children in Great Boston: A prospective cohort study," *Journal of Infectious Diseases*; 160:83, 1989.

Otitis Media in Young Children, Clinical Practice Guidelines Number 12. AHCPR Publication Number 94-0622; July 1994.

10. Commentary:

Otitis media is the major reason cited for taking infants and young children to emergency rooms or to a physician's office. More antibiotics are prescribed by physicians for children with otitis media than for any other reason. The disease causes infants, children and their families great distress and accounts for at least $2.2 to $3 billion in health care bills. Since the current state-of-the-art favors the development of vaccines against otitis media, the development of these vaccines has become an area of emphasis in the NIDCD. NIDCD scientists have recently been successful in developing a promising candidate vaccine. A Phase I clinical study is underway in adult volunteers to evaluate the safety and immunogenicity of the investigational vaccine. More than 30 volunteers have been injected with the vaccine and no adverse reactions have been observed. Later, the vaccine will be tested to determine its clinical effectiveness in children. Preliminary data from this study shows that the vaccine is able to elicit the production of a specific antibody against *Haemophilus influenzae*, a bacteria that is largely responsible for causing otitis media in children. The delivery of this vaccine to combat otitis media would reduce the human and financial toll on infants, children, their families and upon the health care system.

Pain Conditions - Chronic

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 79.0 billion
Estimated Direct Cost	$ 45.0 billion
Estimated Indirect Cost	$ 34.0 billion
Reference Year	1986
IC Providing the Estimate	NIDCR, NINDS
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	No
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	Yes
Interest Rate Used to Discount Out-Year Costs	Not Available
2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: Not Applicable.	
3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	Not Applicable
Attributable to the subject disease as a secondary diagnosis	Not Applicable
Of conditions for which the subject disease is an underlying cause	Not Applicable
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

Bonica, J.J. (1990) General considerations of chronic pain. In: J.J. Bonica, J.D. Loeser, C.R. Chapman, and W.E. Fordyce. The Management of Pain. Volume I. Philadelphia: Lea & Febiger, 180-196, especially pp 181-183.

9. Other Indicators of Burden of Disease:

Estimated that more than one-third of U.S. population experiences chronic pain. Estimated that more than 400 million work days lost in 1986 due to chronic pain. See attached copy of Table 8-1 from Bonica (1990).

10. Commentary:

The cost of illness estimate reported here is based on an analysis by John J. Bonica for 1986. The estimate includes both direct and indirect costs.

Parkinson's Disease

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 6.0 billion
Estimated Direct Cost	$ 2.0 billion
Estimated Indirect Cost	$ 4.0 billion
Reference Year	1992
IC Providing the Estimate	NINDS
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	No
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	Not Available

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 332.

3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

Lierman, T.L., *Building a Healthy America*, 1992, 2nd ed., (Mary Ann Liebert, Inc.).

9. Other Indicators of Burden of Disease:

Incidence: 50,000 per year
Prevalence: ca. 500,000

10. Commentary:

Cost data based on the product of average patient costs and prevalence reported by:

Kurtzke, J.F., and Kurland, L.T., 1983. "The epidemiology of neurologic disease," ed. by Joynt, R.J., 1989. *Clinical Neurology*, Philadephia, PA: J.B. Lippincott Company.

Pelvic Inflammatory Disease

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 6.8 billion
Estimated Direct Cost	Not Available
Estimated Indirect Cost	Not Available
Reference Year	1996
IC Providing the Estimate	NIAID
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	Yes
Interest Rate Used to Discount Out-Year Costs	4 %

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 614 (excluding 614.3, 614.4, 614.6); 615.0; 615.1; 615.9; 633.0-633.9.

3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	Yes
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	Yes
4. Population Base for Cost Estimate (Total U.S. pop or other)	Women, ages 15-44
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: Washington AE and Katz P. Cost of and Payment Source for Pelvic Inflammatory Disease. *JAMA,* 266(18):2565-2569, 1991. For more information contact Penny Hitchcock, NIAID, (301) 496-4020

9. Other Indicators of Burden of Disease:

More than 1 million American women are diagnosed with pelvic inflammatory disease (PID) annually and it is likely that many more cases go undiagnosed [MMWR 40 (RR-5):1-25, 1991]. Most primary cases of PID are due to chlamydial or gonococcal infections. Following PID, scarring will cause approximately 20% of women to become unfertile, 18% to develop chronic pelvic pain, and 9% to develop ectopic pregnancies (Sex Transm. Dis. 1992:19:185-92). Sexually active teenage females are more likely to develop PID than are older sexually active women. Approximately 70% of females who develop PID are younger than 25 years old and have not yet had a child [Sex Transm. Dis. 1991:18(1):46-64].

10. Commentary:

The 1991 study cited above estimated direct and indirect costs for PID and PID associated

sequelae in the U.S. in 1990, determined the payment sources for PID, examined PID costs and payment sources for 1983 through 1990, and projected estimated costs of PID through 2000. The reported total cost of PID for 1996, $6.8 billion, was projected assuming a constant 4% rate of inflation and a constant PID incidence rate. The study also made projections based on different incidence rate scenarios. At a 1% increase in PID incidence per year and a constant rate of inflation, the study estimated that 1996 costs would exceed $7 billion. These derived cost estimates may be conservative, however, because the analysis included only women aged 15 to 44 years (studies indicate that adolescents younger than 15 and women older than 44 also may be experiencing PID and its sequelae), costs of treating infertility were probably underestimated, and psychosocial costs were not included. If trends in PID incidence continue, by the year 2000 projected costs will be $10 billion, with an increasing proportion of direct costs paid by public payment sources.

Perinatal Period – Conditions Originating in the Perinatal Period

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost — Not available
   Estimated Direct Cost — Not available
   Estimated Indirect Cost — Not Available
   Reference Year — Not Available
   IC Providing the Estimate

   Direct Costs Include: Other related nonhealth costs — Not Available
   Indirect Costs Include:
   - Mortality costs — Not Available
   - Morbidity costs: Lost workdays of the patient — Not Available
   - Morbidity costs: Reduced productivity of the patient — Not Available
   - Lost earnings of unpaid care givers — Not Available
   - Other related health costs — Not Available

   Interest Rate Used to Discount Out-Year Costs — Not Available
2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: Not Available.
3. Estimate Includes Costs:
   - Of related conditions beyond primary, strictly coded ICD-9-CM category — Not Available
   - Attributable to the subject disease as a secondary diagnosis — Not Available
   - Of conditions for which the subject disease is an underlying cause — Not Available
4. Population Base for Cost Estimate (Total U.S. pop or other) — Not Available
5. Annual (prevalence model) or Lifetime (incidence model) Cost: — Not Available
6. Perspective of Cost Estimate (Total society, Federal budget, or Other) — Not Available
7. Approach to Estimation of Indirect Costs — Not Available

8. Source of Cost Estimate: Not Available.

9. Other Indicators of Burden of Disease: In 1994, conditions originating in the perinatal period represented the 15th leading cause of all deaths at a rate of 127.2 per 100,000 U.S. population. (CDC, MVSR, Oct 23, 1995, Vol. 43(13):7.

10. Commentary:

Present estimates of direct costs associated with perinatal diseases and conditions are severely underestimated. Often, they only include the initial hospital costs and use the lower estimate of mean costs for a neonatal intensive care unit stay, plus a nominal estimate for physician payments. Given that about 30-40 percent of all of these infants are at risk for rehospitalization, these direct cost figures consistently underestimate the true direct cost.

It is also particularly difficult to estimate indirect costs for perinatal diseases and conditions. One reason is that the human capital approach often used in developing indirect cost estimates assigns little or no economic value to the life of a neonate -- let alone to a stillbirth, miscarriage,

or an aborted fetus (all categories contain in this classification. In addition, because of their diversity and lack of adequate data, it is often difficult to estimate the economic impact of long-term sequelae associated with the many conditions in this category. For instance, some of the diseases and conditions included in the perinatal classification, range from those affecting the mother, such as maternal deaths to maternal infections and injury, to those affecting the fetus and newborn, including fetal alcohol syndrome, neonatal drug addiction, major pulmonary conditions (i.e., respiratory distress syndrome), hematological disorder (i.e., intraventricular hemorrhage), infectious conditions (i.e., neonatal herpes), endocrine disturbances, and birth trauma (i.e., various nerve, cranial, and eye injuries, etc.). Some of these conditions can lead to simple or profound physical, cognitive, or mental disabilities. These, in turn, can influence average life spans, overall productivity, as well as the need for long-term, and potentially expensive, medical and non-medical services, which may not be measured in the direct costs portion of many estimates. In addition, many of the costs associated with these chronic physical, cognitive, or mental disabilities would overlap with the other estimates for mental disorders, drug abuse, etc.

Perinatal Period - Births, Preterm, and Low Weight

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	Not Available
Estimated Direct Cost	$ 2.0 billion+
Estimated Indirect Cost	Not Available
Reference Year	1994
IC Providing the Estimate	NICHD
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	No
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	Not Available

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 765.1.

3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Not applicable

8. Source of Cost Estimate:

A historical estimate derived by program staff was recently used as a conservative benchmark in a brochure developed for the NIH Consensus Development Conference on the Effects of Corticosteroids for Fetal Maturation on Outcomes, March 1994. This reported amount has since been reviewed by an economist.

9. Other Indicators of Burden of Disease:

In 1995, the number of infant deaths from disorders related to premature birth and unspecified low birth weight was 3,827 making this set of disorders the 2nd leading cause of death among U.S. infants. (CDC, MVS, Oct 4, 1996, Vol.45(3(s)2). Although the total number of deaths in this category is slightly down from 3,870 in 1994 to 3,827 in 1995, the infant death rate in this category is slightly up from about 97.6 (prov.) in 1994 to 98.1 (prov.) in 1995. (CDC, MVS, Oct 23, 1995, Vol 43 (13).

10. Commentary:

The brochure states that "U.S. preterm births are associated with *more than* $2 billion in health

care costs annually." It was clear that the estimate did not include several economic considerations and therefore reflected a low estimate for direct medical costs. The estimate only included hospital costs and nominal physician payments. Mean hospital charges for a preterm or low birth weight infant requiring a stay in the NICU (neonatal intensive care unit) ranged from $9,800-19,600 based on a variety of state and national discharge data. Hospital costs were calculated at a cost-to-charge ratio of 0.61. Physician payments were estimated to equal 20% of hospital costs and actual physician payments received were estimated to equal 80% of this later amount. Estimated costs per infant totaled $6,942 in initial direct medical costs due to hospital costs and physician payments.

To derive the total U.S. health care cost associated with preterm/low weight births, the incidence of preterm/low weight births referenced from the *National Center for Health Statistics 1991* was multiplied by the average cost per infant born preterm. The total amount reported did not reflect: 1) hospital charges (which are higher than hospital costs), 2) the full range of costs for neonatal care in the NICU, 3) and the full charge for professional services, 4) costs associated with second hospitalizations even though 30-40% of low birth weight infants are at risk for second hospitalizations, 5) indirect costs accrued for non-medical services during the hospital stay, and 6) long-term direct or indirect costs despite the potential for long-term sequelae associated with preterm birth.

Perinatal Period - Neonatal Respiratory Distress Syndrome

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 1.1 billion
Estimated Direct Cost	$ 0.7 billion
Estimated Indirect Cost	$ 0.4 billion
Reference Year	1997
IC Providing the Estimate	NHLBI
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	6 %

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 769.

3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate:

Unpublished. Contact Mr. Thomas Thom, NHLBI, 301-435-0710.

References:

1. Health Care Financing Administration. National Health Expenditure Table 2: http://www.hcfa.gov/stats/nhe-oact/tables/t10.htm

2. Preprinted tables obtained by personal communication from Elaine Wood, National Center for Health Statistics from the forthcoming report: National Center for Health Statistics. Detailed diagnoses and procedures, National Hospital Discharge Survey, 1997. *Vital and Health Statistics* (in press).

3. Detailed mortality tables from the NCHS website: http://cdc.gov/nchswww/

4. Obtained by personal communication from Wendy Max, University of California at San Francisco on July 13, 1998.

9. Other Indicators of Burden of Disease:

In 1998, RDS was the fourth leading cause of infant mortality occurring at a rate of 31.0 per 100,000 live births. (CDC, NVSR, October 5, 1999. Vol. 47, No. 25.

10. Commentary:

Neonatal RDS (NRDS) direct costs for 1997 are estimated by applying to the 1997 HCFA estimate of national health expenditures for hospital care ($371.1 billion) (1) the ratio of days in hospitals in 1997 due to NRDS (295,000 days) and total days (157,458,000) reported by the National Hospital Discharge Survey, of NCHS (2). Only the primary diagnosis of NRDS reported in the surveys was considered. Allocating costs according to the primary diagnosis eliminated overlap with other diseases. Costs associated with NRDS as a comorbid condition to some other primary diagnosis were not included. Costs incurred by family or other personal caregivers for NRDS patients cannot be estimated and were not included. The national health expenditures that cannot be allocated to diseases (e.g. construction and research) were not included in the NRDS direct costs.

The indirect morbidity cost of NRDS cannot be estimated. The indirect mortality cost of NRDS in 1997 represents lost productivity based on lost earnings attributed to premature deaths from NRDS in that year. It was estimated by applying the numbers of NRDS deaths in 1997, by age and sex reported from national vital statistics (3), to the age-sex 1997 estimates of the present value of lifetime earnings discounted at six percent (4). NRDS deaths in 1997 were those where NRDS was the underlying cause of death regardless of what other contributing causes may have been present. Other deaths, where NRDS was a contributing cause, were not included.

Perinatal Period - Sudden Infant Death Syndrome (SIDS)

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	Not available
Estimated Direct Cost (mortality)	Not available
Estimated Indirect Cost	$951 million
Reference Year	1995
IC Providing the Estimate	NHLBI
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	6 %

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 798.0(2).

3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate:

Unpublished. Contact Mr. Thomas Thom, NHLBI, 301-435-0710.

9. Other Indicators of Burden of Disease:

Since 1980, SIDS has been the 2nd leading cause of infant mortality. However, in 1994, SIDS dropped from the second to the third leading cause of infant mortality. The provisional incidence rate for SIDS in 1995 is 84.2 per 100,000 live births; an 8.3% decrease in one year. (CDC, MMWR, Oct 11, 1996, Vol. 45(40): 862.

10. Commentary:

Mr. Thomas Thom from NHLBI recently updated the cost of SIDS to reflect, $951 million in indirect costs of mortality. This figure is based on calculations using the: 1)1995, CDC/MVSR reported provisional deaths for SIDS approximated at 2,033 and 1,246 deaths in male and female infants respectively; 2)1992, Rice and colleagues estimate of lost wages for deaths at age 1,

$266,965 for males and $222,965 for females; and 3)most recent Bureau of Census estimate of a 5% increase in mean earnings of year-around, full-time workers ages 14 and over, from 1992 to 1993. Multiplying the 1995 incidence of SIDS and the inflated economic values for male and female infants sums up to $1 billion in indirect costs associated with SIDS mortality for 1995. e.g. $266,965 x 1.16 x 2,033 = $662 million for male infants, $222,167 x 1.16 x 1,246 = $338 million for female infants.

Apparently, the decline in the incidence of SIDS deaths is rapid enough to off set increases in inflation of lifetime earnings so that indirect mortality costs declined from $1.3 billion to $951 million between 1991 and 1996.

Pneumonia and Influenza

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 25.6 billion
Estimated Direct Cost	$ 18.6 billion
Estimated Indirect Cost	$ 7.0 billion
Reference Year	1999
IC Providing the Estimate	NHLBI
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	6 %

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 480-487.
3. Estimate Includes Costs:

Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No

4. Population Base for Cost Estimate (Total U.S. pop or other) — Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost: — Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other) — Total Society
7. Approach to Estimation of Indirect Costs — Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

Unpublished. Contact Mr. Thomas Thom, NHLBI, 301-435-0710.

9. Other Indicators of Burden of Disease:

Combined, these two diseases comprise the sixth leading cause of death as an underlying cause, and pneumonia is a common contributing cause to many more deaths. Influenza is one of the most common acute illnesses.

10. Commentary:

Direct costs by type of cost for total respiratory diseases in 1995 were estimated by Tom Hodgson (National Center for Health Statistics) in a report to be published. He used a variety of survey data from NCHS and the Health Care Financing Administration, and elsewhere. Pneumonia and influenza costs for 1995 are estimated by applying to Hodgson's total respiratory

costs the proportions that pneumonia and influenza are of total respiratory diagnoses for: a) hospital days, b) physician office visits, c) drug mentions in physician visits, and d) home health discharges in the latest NCHS surveys. HCFA estimates of personal health care expenditures increased 22% over the four years 1993 ($790.5 billion) to 1997 ($969.0 billion). This percent increase is applied to the costs in 1995 to estimate them for 1999. Only the primary diagnosis of pneumonia and influenza reported in the surveys was considered. Allocating costs according to the primary diagnosis eliminated overlap with other diseases. Costs associated with pneumonia and influenza as a comorbid condition to some other primary diagnosis were not included. Costs incurred by family or other personal caregivers for pneumonia and influenza patients cannot be estimated and were not included. The national health expenditures that cannot be allocated to diseases (e.g. construction and research) were not included in the pneumonia and influenza direct costs.

Indirect morbidity costs of pneumonia and influenza could not be estimated. The indirect mortality cost of pneumonia and influenza in 1999 represents lost productivity based on lost earnings attributed to premature deaths from pneumonia and influenza in that year. It was estimated by applying the numbers of pneumonia and influenza deaths in 1997, by age and sex, reported from national vital statistics, to the age-sex estimates of the present value of lifetime earnings discounted at six percent. These lifetime values were estimated for 1997 by Wendy Max and Dr. Dorothy Rice (University of California, San Francisco). They are not published. They were obtained by personal communication. Those values were inflated to 1999 using an inflation factor (10%) based on the 1995-1997 change in mean annual earnings of year-round full time workers reported by the Bureau of the Census Pneumonia and influenza deaths in 1997 were those where pneumonia and influenza was the underlying cause of death regardless of what other contributing causes may have been present. Other deaths, where pneumonia and influenza was a contributing cause, were not included. The accuracy of estimates of the present value of lifetime earnings has not been assessed by anyone at NHLBI; estimates were taken at face value.

Psoriasis

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	Not Available
Estimated Direct Cost	$ 3.0 billion
Estimated Indirect Cost	Not Available
Reference Year	1994
IC Providing the Estimate	NIAMS
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	No
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	Not Available

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 696.

3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

Gerald D. Weinstein and James G. Krueger. *Therapy of Moderate-to-Severe Psoriasis*, Portland, OR, National Psoriasis Foundation, 1993, p. 19.

H. M. Sander, L.F. Morris, C.M. Phillips, P.E. Harrison, and A. Menter. The Annual Cost of Psoriasis. *Journal of the American Academy of Dermatology* 1993, 28:422-425.

9. Other Indicators of Burden of Disease:

According to a widely quoted paper published in the *Journal of the American Academy of Dermatology* (10:842-850, 1984), four million Americans suffer from psoriasis; approximately one-quarter of these patients have severe psoriasis (25 percent or more of the body surface covered with psoriatic lesions). In 1995, this number is likely to be considerably greater than four million.

10. Commentary:

According to Weinstein and Krueger (cited above), the costs of psoriasis care are considerable. The mean annual direct costs for those with moderate-to-severe disease can range from $1,318 (methotrexate treatment) to $3,914 (tar plus ultraviolet light [UVB] therapy).

Respiratory Distress Syndrome, Acute (Adult)

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 4.1 billion
Estimated Direct Cost	$ 3.2 billion
Estimated Indirect Cost	$ 0.9 billion
Reference Year	1999
IC Providing the Estimate	NHLBI
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	6 %

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 518.5, 518.8.
3. Estimate Includes Costs:

Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No

4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate:

Unpublished. Contact Thomas Thom, NHLBI, 301-435-0710..

9. Other Indicators of Burden of Disease:

It is estimated by the NHLBI that 150,000 previously healthy adults develop ARDS every year. The case-fatality rate is 50 percent. ARDS can follow trauma and surgery. The national morbidity and mortality burden of ARDS is difficult to estimate because diagnostic accuracy of hospital and mortality statistics on ARDS is limited.

10. Commentary

Cost estimates for ARDS are based on national hospital discharge, physician office visit, and mortality data classified by the International Classification of Diseases as: Pulmonary insufficiency following trauma and surgery (518.5) and Other diseases of lung(518.8). Both codes include ARDS and other diseases as inclusion terms, suggesting the cost estimates may be

overstated. However, a larger part of hospitalzations and mortality from ARDS is secondary to other diseases.

Direct costs by type of cost for total respiratory diseases in 1995 were estimated by Tom Hodgson (National Center for Health Statistics) in a report to be published. He used a variety of survey data from NCHS and the Health Care Financing Administration, and elsewhere. ARDS costs for 1995 are estimated by applying to Hodgson's total respiratory costs (mostly hospital costs) the proportion that ARDS is of total respiratory diagnoses for hospital days reported in the latest NCHS survey, 1997. The estimate of the cost of non hospital-related physician services and drugs are close to zero, but are included. Costs for 1995 were inflated to 1999 by a 7% inflation factor from HCFA hospital costs in 1995 ($347.2 billion) and 1997 ($371.1 billion). Only the primary diagnosis of ARDS reported in the surveys was considered. Allocating costs according to the primary diagnosis eliminated overlap with other diseases. Costs associated with ARDS as a comorbid condition to some other primary diagnosis were not included. Costs incurred by family or other personal caregivers for ARDS patients cannot be estimated and were not included. The national health expenditures that cannot be allocated to diseases (e.g. construction and research) were not included in the ARDS direct costs.

The indirect morbidity cost of ARDS cannot be estimated. The indirect mortality cost of ARDS in 1997 represents lost productivity based on lost earnings attributed to premature deaths from ARDS in that year. It was estimated by applying the numbers of ARDS deaths in 1997, by age and sex, reported from national vital statistics, to the age-sex estimates of the present value of lifetime earnings discounted at six percent. These lifetime values were estimated for 1997 by Wendy Max and Dr. Dorothy Rice (University of California, San Francisco). They are not published. They were obtained by personal communication. Other deaths, where ARDS was a contributing cause, were not included. The accuracy of estimates of the present value of lifetime earnings has not been assessed by anyone at NHLBI; estimates were taken at face value.

Septicemia

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 7.2 billion
Estimated Direct Cost	$ 4.9 billion
Estimated Indirect Cost	$ 2.3 billion
Reference Year	1998
IC Providing the Estimate	NHLBI
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	6 %

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 038(2).
3. Estimate Includes Costs:

Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No

4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate:

Unpublished. Contact Mr. Thomas Thom, NHLBI, 301-435-0710.

9. Other Indicators of Burden of Disease:

In 1996, septicemia was the 12th leading cause of death causing over 20,000 deaths. It is a contributing cause to about 80,000 additional deaths.

10. Commentary:

Direct costs by type of cost for total infectious diseases in 1995 were estimated by Tom Hodgson (National Center for Health Statistics) in a report to be published. He used a variety of survey data from NCHS and the Health Care Financing Administration, and elsewhere. Septicemia costs for 1995 are estimated by applying to Hodgson's total infectious disease costs (hospital only) the proportion that septicemia is of total infectious disease diagnoses for hospital days reported in the latest NCHS survey. From the NCHS publication "Health, US 1996-97", total personal health expenditures increased 19% from $740.5 billion in 1992 to $878.8 bilion in 1995. Septicemia costs for 1995 were increased by that same percentage to estimate the cost in

1998. Only the primary diagnosis of septicemia reported in the survey is considered. Allocating costs according to the primary diagnosis eliminated overlap with other diseases. Costs associated with septicemia as a comorbid condition to some other primary diagnosis were not included. Costs incurred by family or other personal caregivers for septicemia patients cannot be estimated and were not included. The national health expenditures that cannot be allocated to diseases (e.g. construction and research) were not included in the septicemia direct costs.

Indirect morbidity cost of septicemia could not be estimated. The indirect mortality cost in 1998 represents lost productivity based on lost earnings attributed to premature deaths from septicemia in that year. It was estimated by applying the numbers of septicemia deaths in 1996, by age and sex, reported from national vital statistics, to the age-sex estimates of the present value of lifetime earnings discounted at six percent. These lifetime values were estimated for 1992 by Dr. Dorothy Rice (University of California, San Francisco). They are not published. Those values were inflated to 1998 using an inflation factor based on mean annual wages of year-round full time workers reported by the Bureau of the Census and extrapolated to 1998. Septicemia deaths in 1996 were those where septicemia was the underlying cause of death regardless of what other contributing causes may have been present. Other deaths, where septicemia was a contributing cause, were not included. The accuracy of estimates of the present value of lifetime earnings has not been assessed by anyone at NHLBI; estimates were taken at face value.

Sickle Cell Anemia

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 0.9 billion
Estimated Direct Cost	$ 0.6 billion
Estimated Indirect Cost	$ 0.3 billion
Reference Year	1995
IC Providing the Estimate	NHLBI
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	6 %

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 282.6.

3. Estimate Includes Costs:	
Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No
4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Human Capital

8. Source of Cost Estimate:

Unpublished. Contact Mr. Thomas Thom, NHLBI, 301-435-0710.

9. Other Indicators of Burden of Disease:

An estimated 72,000 Black Americans have this disease.

10. Commentary:

Direct cost estimates for sickle cell anemia in 1995 were estimated by allocating to sickle cell anemia a portion of the 1995 health expenditures for total blood diseases to be reported by Tom Hodgeon of the National Center for Health Statistics. The portion was determined from proportions (sickle cell anemia to all blood diseases) in the latest NCHS surveys of hospital days of care, physician office visits, and drug mentions in physician visits. Only the primary diagnosis of sickle cell anemia reported in the surveys was considered. Costs associated with sickle cell anemia as a comorbid condition to some other primary diagnosis were not included. Costs incurred by family or other personal caregivers for sickle cell anemia patients cannot be

estimated and were not included. The national health expenditures that cannot be allocated to diseases (e.g. construction and research) were not included in the sickle cell anemia direct costs.

There is no estimate of indirect cost of morbidity. The indirect mortality cost of sickle cell anemia in 1995 represents lost productivity based on lost earnings attributed to premature deaths from sickle cell anemia in that year. It was estimated by applying the numbers of sickle cell anemia deaths in 1993, by age and sex, reported from national vital statistics, to the age-sex estimates of the 1992 present value of lifetime earnings discounted at six percent. These lifetime values were reported in a cost study by Dorothy Rice. Estimated indirect mortality costs of sickle cell anemia were inflated from 1992 to 1995 based on a 5 percent per year inflation rate, estimated from Bureau of the Census estimates of mean earnings of workers. Sickle cell anemia deaths in 1993 were those where sickle cell anemia was the underlying cause of death regardless of what other contributing causes may have been present. Other deaths, where sickle cell anemia was a contributing cause, were not included. The accuracy of estimates of the present value of lifetime earnings has not been assessed by anyone at NHLBI; estimates were taken at face value.

Smoking

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	$ 138.0 billion
Estimated Direct Cost	$ 80 billion
Estimated Indirect Cost	$ 58 billion
Reference Year	1995
IC Providing the Estimate	NIDA
Direct Costs Include: Other related nonhealth costs	Not Available
Indirect Costs Include:	
Mortality costs	Yes, $49.5 billion
Morbidity costs: Lost workdays of the patient	Yes
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	Not Available
Interest Rate Used to Discount Out-Year Costs	4 %

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: No relevant code.
3. Estimate Includes Costs:

Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	Yes

4. Population Base for Cost Estimate (Total U.S. pop or other) — Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost: — Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other) — Total Society
7. Approach to Estimation of Indirect Costs — Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate).

Rice, D.P. Economic Costs of Substance Abuse, 1995. Proceedings of the Association of American Physicians, 111: 119-125, 1999.

9. Other Indicators of burden of disease:

Smoking-related deaths for 1996 estimated at 422,081. Estimate is extrapolated from the 1990 estimate from the Office of Smoking and Health, CDC, and the 1990 and 1996 estimates for alcohol related deaths estimated by NIAAA. In 1990, smoking-related deaths were estimated at 418,690 and alcohol related deaths at 109,751. Calculating the ratio of smoking related deaths to alcohol related deaths, yielded a factor of 3.8149 (i.e. there were approximately 4 times as many smoking related deaths as alcohol related deaths). Multiplying the 1996 alcohol related death estimate by this factor yields the 1996 estimate for smoking related deaths.

10. Commentary:

Smoking is a major contributor in deaths from lung cancer (90 percent), coronary heart disease, chronic bronchitis, and emphysema, and cancers of the pancreas, trachea, bronchus, and larynx. Therefore, smoking-related cost estimates are derived from actuarial data under diagnoses such as respiratory, pulmonary or heart disease, or cancer.

The estimates of smoking costs omit the cost of complications associated with health problems of newborns, such as low birth weight caused by mother's smoking. Also omitted are the costs of illnesses caused by environmental tobacco smoke exposure of children and adults, such as asthma and otitis media.

Suicide

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	Not Available
Estimated Direct Cost	Not Available
Estimated Indirect Cost	$ 10.2 billion
Reference Year	1985
IC Providing the Estimate	NIMH
Direct Costs Include: Other related nonhealth costs	No
Indirect Costs Include:	
Mortality costs	Yes
Morbidity costs: Lost workdays of the patient	Not Applicable
Morbidity costs: Reduced productivity of the patient	Not Applicable
Lost earnings of unpaid care givers	Not Available
Other related nonhealth costs	Not Available
Interest Rate Used to Discount Out-Year Costs	6 %

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: E950-E959.
3. Estimate Includes Costs:

Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No

4. Population Base for Cost Estimate (Total U.S. pop or other) — Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost: — Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other) — Total Society
7. Approach to Estimation of Indirect Costs — Human Capital

8. Source of Cost Estimate: (Reference published or unpublished report, or address and telephone of person/office responsible for estimate)

D.P. Rice, S. Kelman, L.S. Miller, S. Dunmeyer, 1990. *"The Economic Costs of Alcohol and Drug Abuse and Mental Illness: 1985*. DHHS Publication #: ADM 90-1694. Washington, D.C., U.S. DHHS. (parent study)

D.P. Rice, S. Kelman, L.S. Miller, 1991. "Estimates of Economic Costs of Alcohol and Drug Abuse and Mental Illness, 1985 and 1988." *Public Health Reports*, 106:280-292.

D.P. Rice and L.S. Miller, 1993. "The Economic Burden of Affective Disorders" in *Research in the Economics of Mental Health*, Eds., T.W. Hu and A. Rupp, pp. 37-53. JAI Press. (Estimates derived from data on p. 47-48 and Table 5 by Agnes Rupp, Ph.D., NIMH, phone: 301-443-4233).

MMWR, 1987. Vol. 36, No. 32(August 21):531-534.

9. Other Indicators of Burden of Disease:

In 1991, suicide was the eighth leading cause of death. The death rate per 100,000 population was 12.2.

Another measure of the burden of suicide is in years of potential life lost (YPLL). In 1984, suicide accounted for 646,000 YPLL. White males had the highest crude rate of YPLL due to suicide (474/100,000). They were followed by males of all other races, except blacks (350/100,000), by black males (303/100,000), and by white females (118/100,000). Suicides committed by firearms accounted for 57% of the total YPLL attributable to suicide.

10. Commentary:

The study by Dr. Rice on the economic burden of affective disorders focuses on depression-related suicide. Approximately 60% of all suicides are depression-related.

In Dr. Rice's estimate of lost productivity due to premature death, the expected value of an individual's future earnings, by gender and age, are taken into account. This estimate also considers life expectancy for different age and gender groups; changing patterns of earnings at successive ages; varying labor force participation rates; an imputed value for house-keeping services; and a 6% discount rate to convert a stream of earnings into its present worth. Dr. Rice estimated that depression-related suicide resulted roughly in 33 person years lost per death; in monetary terms this would be equivalent to a loss of $345,000 per death (1985). No direct cost (if any) data is available for suicide-related death. The presented total estimate of $10.2 billion for all suicides assumes that the age/gender distribution of all suicides was similar to affective disorders-related suicides in 1985.

Tuberculosis

Summary of Methods and Data for Estimate of Costs of Illness

1. Estimated Total Economic Cost	Not Available
Estimated Direct Cost	$ 0.7 billion
Estimated Indirect Cost	Not Available
Reference Year	1991
IC Providing the Estimate	NIAID
Direct Costs Include: Other related nonhealth costs	Yes
Indirect Costs Include:	
Mortality costs	No
Morbidity costs: Lost workdays of the patient	No
Morbidity costs: Reduced productivity of the patient	No
Lost earnings of unpaid care givers	No
Other related nonhealth costs	No
Interest Rate Used to Discount Out-Year Costs	Not Available

2. Category code(s) from the International Classification of Diseases, 9th Revision, Clinical Modification,(ICD-9-CM) for all diseases whose costs are included in this estimate: 010.1-016.9; 017.1-018.9.
3. Estimate Includes Costs:

Of related conditions beyond primary, strictly coded ICD-9-CM category	No
Attributable to the subject disease as a secondary diagnosis	No
Of conditions for which the subject disease is an underlying cause	No

4. Population Base for Cost Estimate (Total U.S. pop or other)	Total U.S. pop.
5. Annual (prevalence model) or Lifetime (incidence model) Cost:	Annual
6. Perspective of Cost Estimate (Total society, Federal budget, or Other)	Total Society
7. Approach to Estimation of Indirect Costs	Not Available

8. Source of Cost Estimate:

Brown, RE, et al. Health-care Expenditures for Tuberculosis in the United States. Arch Intern Med. Vol. 155: 1595-1600.

9. Other Indicators of Burden of Disease:

An estimated 10-15 million people in the U.S. are currently infected with *Mycobacterium tuberculosis*, and approximately 2,000 persons die each year from tuberculosis (TB). In the U.S. a total of 18,361 new cases of tuberculosis were reported to the CDC in 1998. This represents an 8% decrease from 1997, and continues the downward trend first noted in 1993. Despite this progress, 12 states reported either no change or an increase in the number of TB cases between 1997 and 1998 [CDC, MMWR 48(33):732, 1999]. During 1998, approximately 75% of active cases of TB were reported among racial and ethnic minorities. The total number of reported cases of TB in the U.S. decreased by 7.5% in 1998 compared to 1997 in all racial/ethnic groups. In 1998, drug resistant strains of TB accounted for approximately 1.1% of total TB cases in the U.S. for which drug-susceptibility results were reported [CDC, MMWR 48(33):732, 1999].

10. Commentary:

Medical care costs included: screening and follow up examinations, preventive treatment, outpatient treatment for suspected cases, and inpatient hospitalization with related physician services. Other related nonhealth costs included surveillance and outbreak control by the CDC and contact investigations by local public health departments. Indirect costs due to death or lost productivity were not included.

Estimates of surveillance and outbreak control costs were based only on CDC expenditures because the state and city TB programs were unable to identify expenditures by type of activity. Screening expenditures were estimated by compiling information from organizations known to conduct TB screening; however, little data were available on screening activities or the number of individuals screened and therefore the estimate for screening expenditures is incomplete.

Estimates of the resources for contact investigations and preventive treatment were based upon responses from a small survey of TB programs and do not capture preventive therapy in private physician offices. The data were limited due to the scarcity and variability of these figures.

Analysis of variation in estimates provided a range of expenditures from $515 million to $750 million.